Jet Shapes using MidPoint (II)

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Outlook

- Event Selection
- Jet Shapes (Raw)
- Corrections to Hadron Level
- Systematics
- Final Results

Event Selection

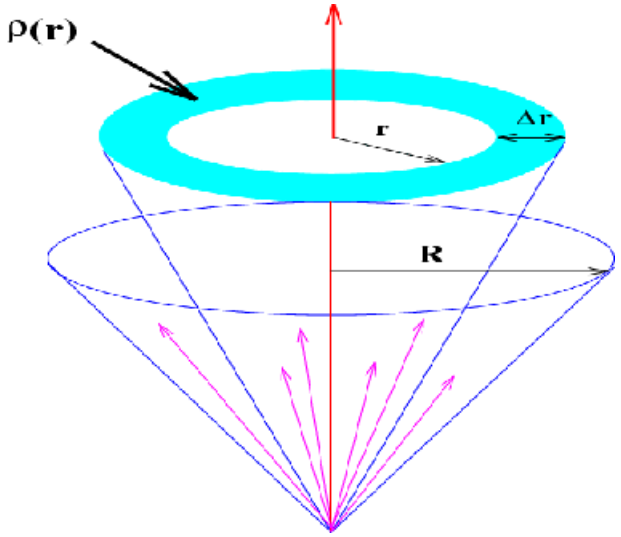
- Using MidPoint Algorithm (R=0.7) (merging at 75%)

- Using all Jet Data before Shutdown (~200 pb-1)
  - J5 (for pt > 30 GeV)
  - J20 (for Pt > 45 GeV)
  - J50 (for Pt > 70 GeV)
  - J70 (for Pt > 95 GeV)
  - J100(for Pt > 130 GeV)

  } Based on Monica's Studies

- Selection Cuts
  - At least one central jet (0.1 < |Y| < 0.7) with Pt> 30 GeV
  - MET_significance < 3.5 GeV^-1/2
  - |V_z| < 60 cm
  - N(vxt) = 1
- Comparison DATA (5.3.1pre4) with MC Pythia/ Herwig (4.9.1)

Jet Shapes using COT (Ia)



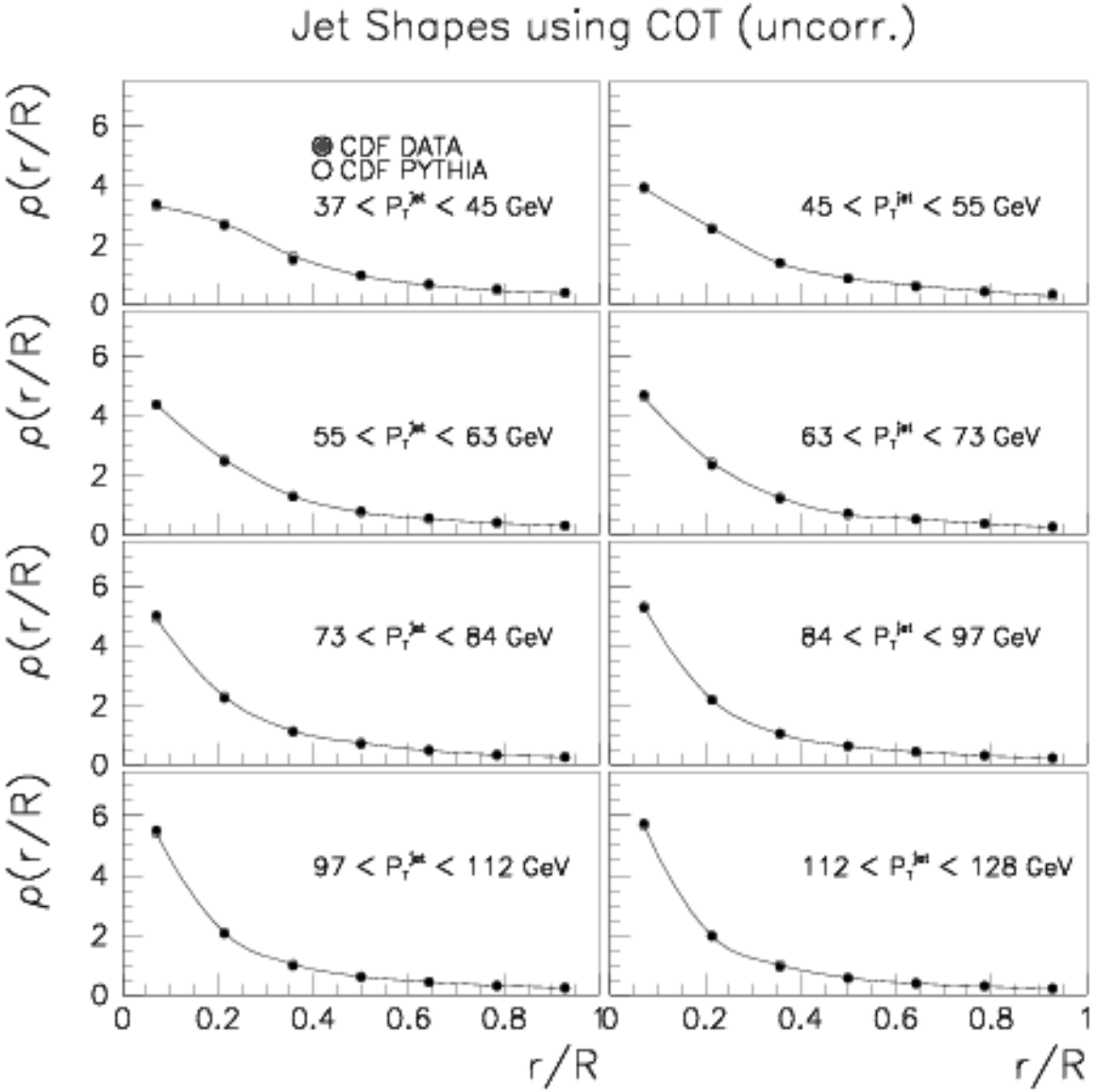
$$\rho(r) = \frac{1}{\Delta r}\frac{1}{N_{jet}}\frac{\sum P_T(r \pm \Delta r/2)}{\sum P_T(0,R)}$$

$0.5\,\mathrm{GeV} < P_T^{track} < 100\,GeV$

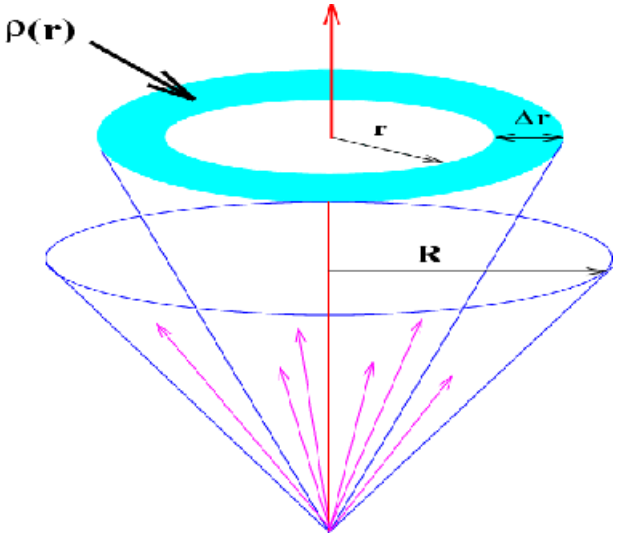
$|\eta^{track}| < 1.5$

$|z^{track} - V_z| < 2\,\mathrm{cm}$

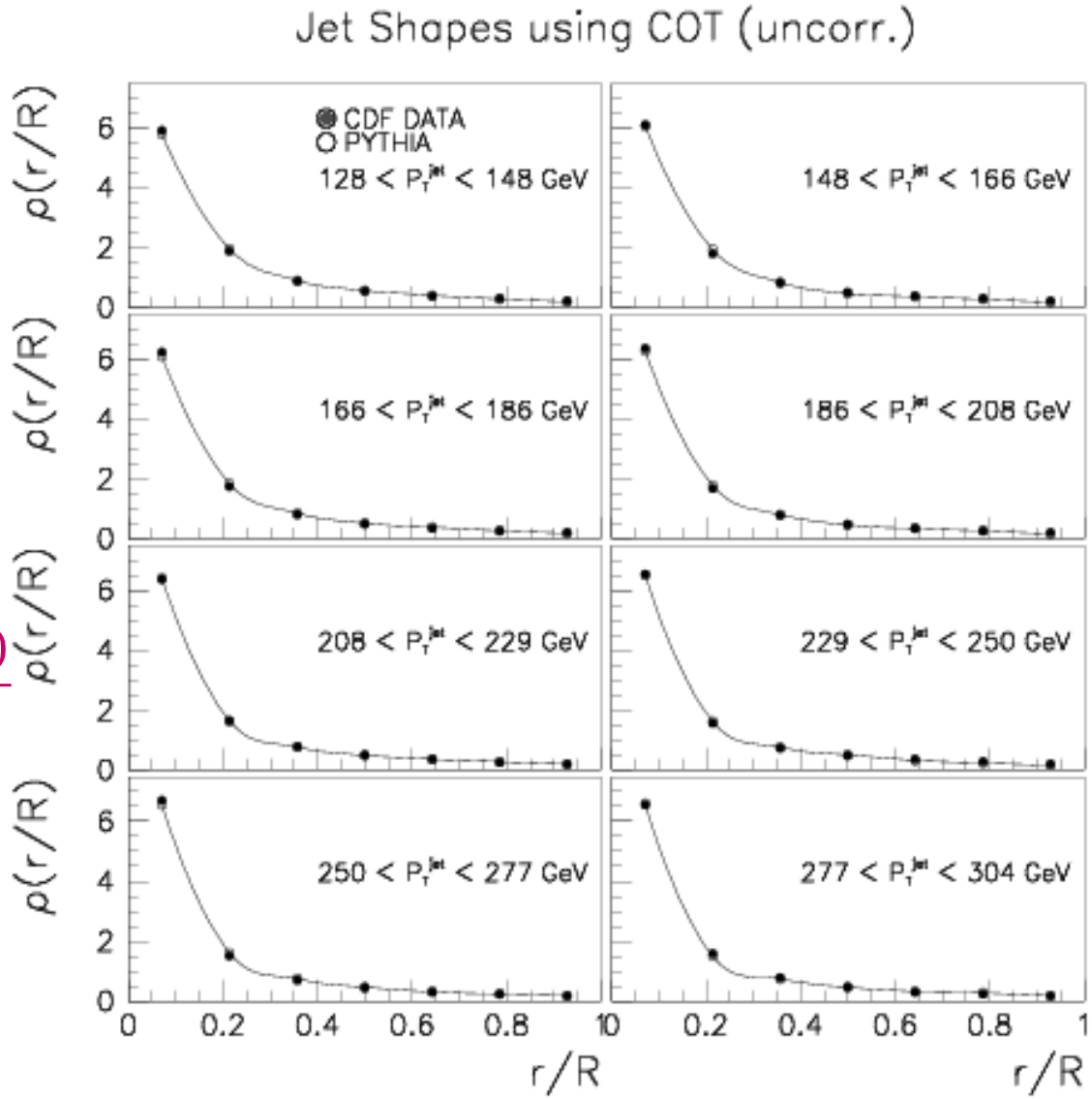
$\Delta R(\mathrm{track - jet}) < 0.7$



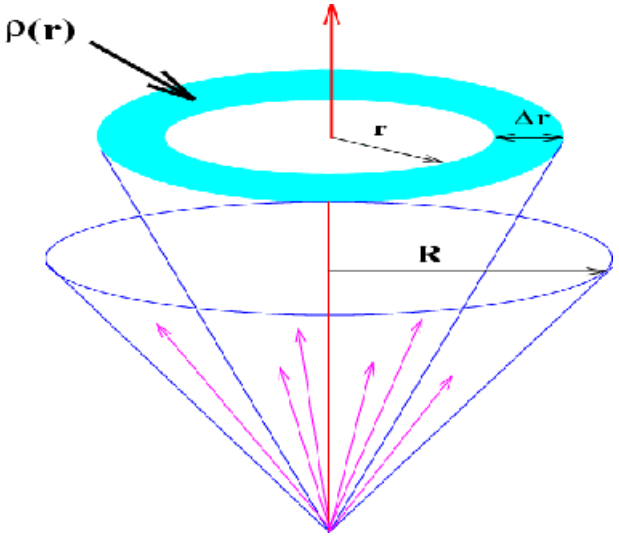
Jet Shapes using COT (Ib)



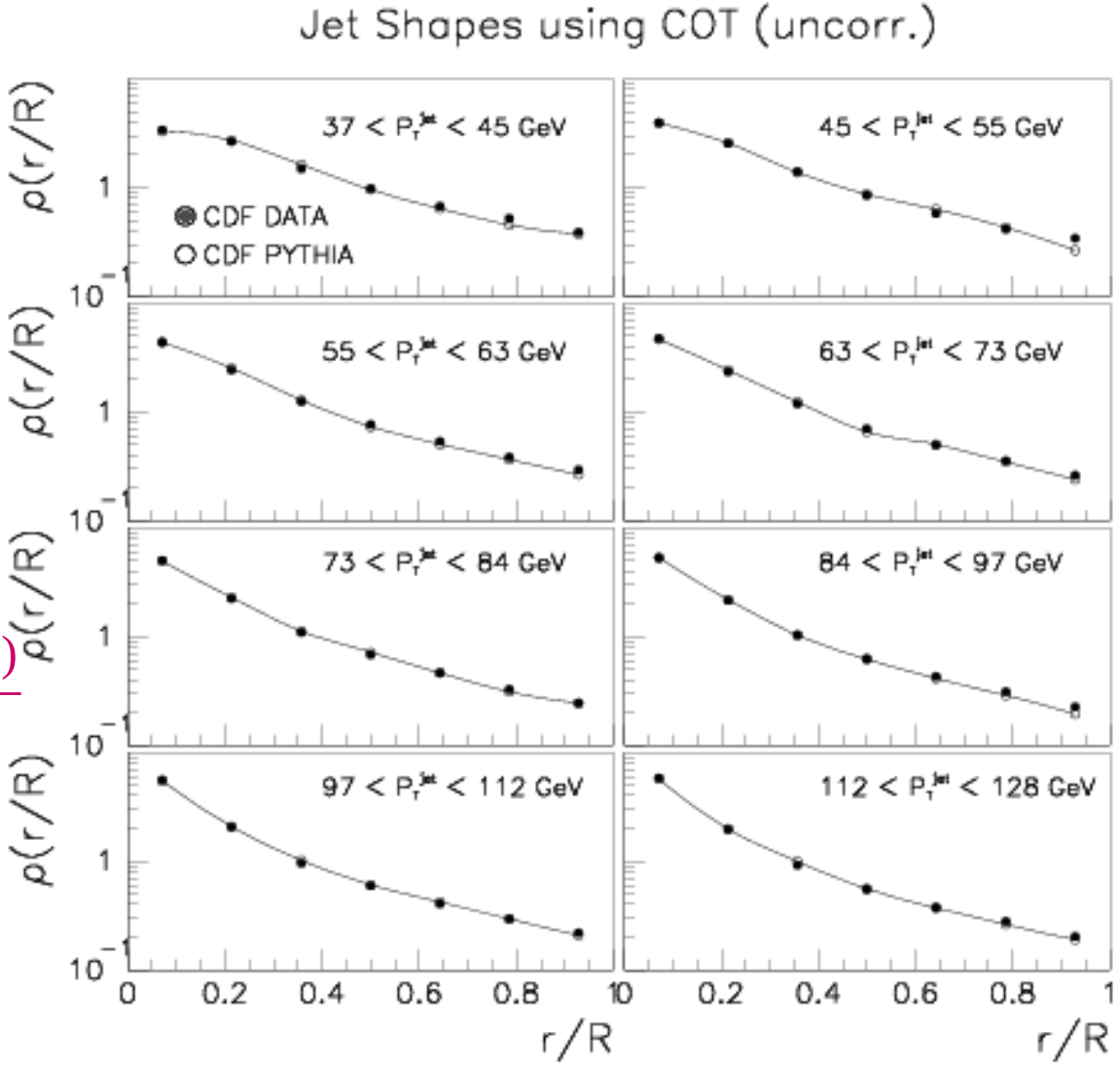
$$\rho(r) = \frac{1}{\Delta r}\frac{1}{N_{jet}}\frac{\sum P_T(r \pm \Delta r/2)}{\sum P_T(0,R)}$$



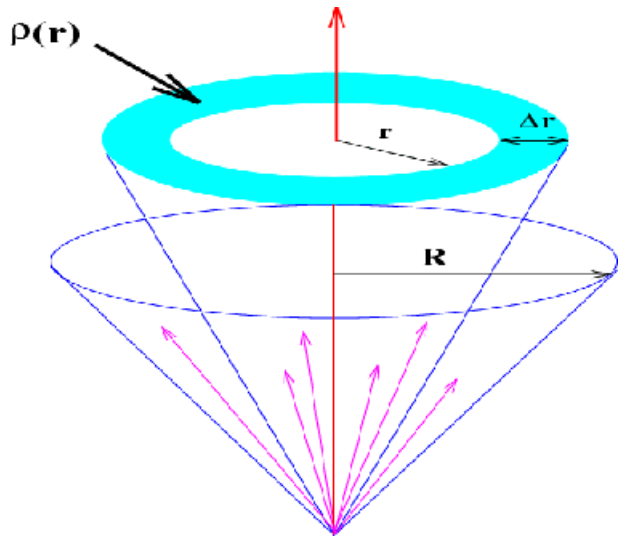
Jet Shapes using COT (Ic)



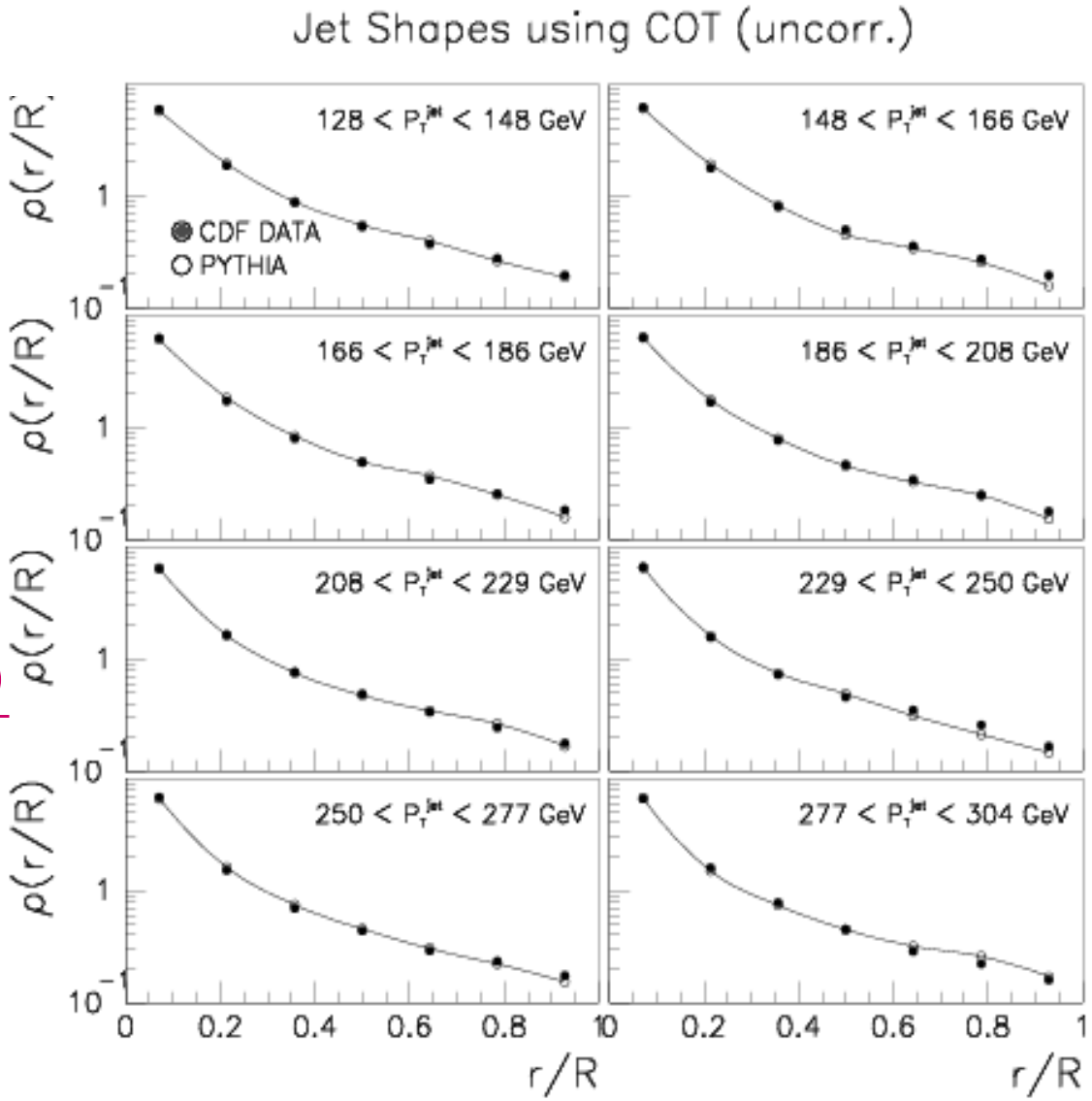
$$\rho(r) = \frac{1}{\Delta r}\frac{1}{N_{jet}}\frac{\sum P_T(r \pm \Delta r/2)}{\sum P_T(0,R)}$$



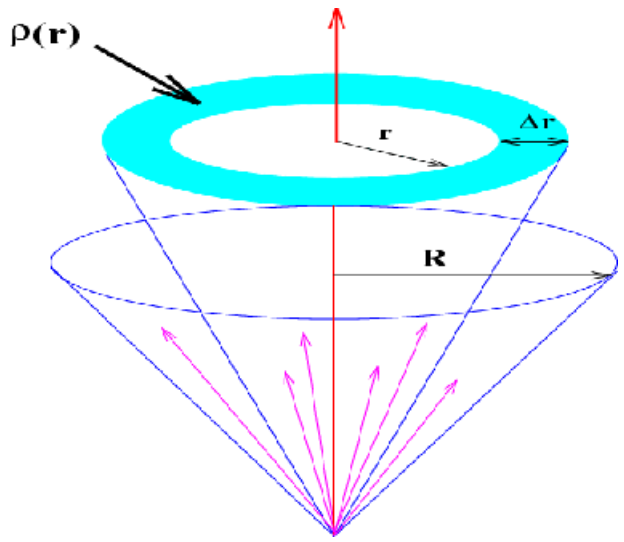
Jet Shapes using COT (Id)



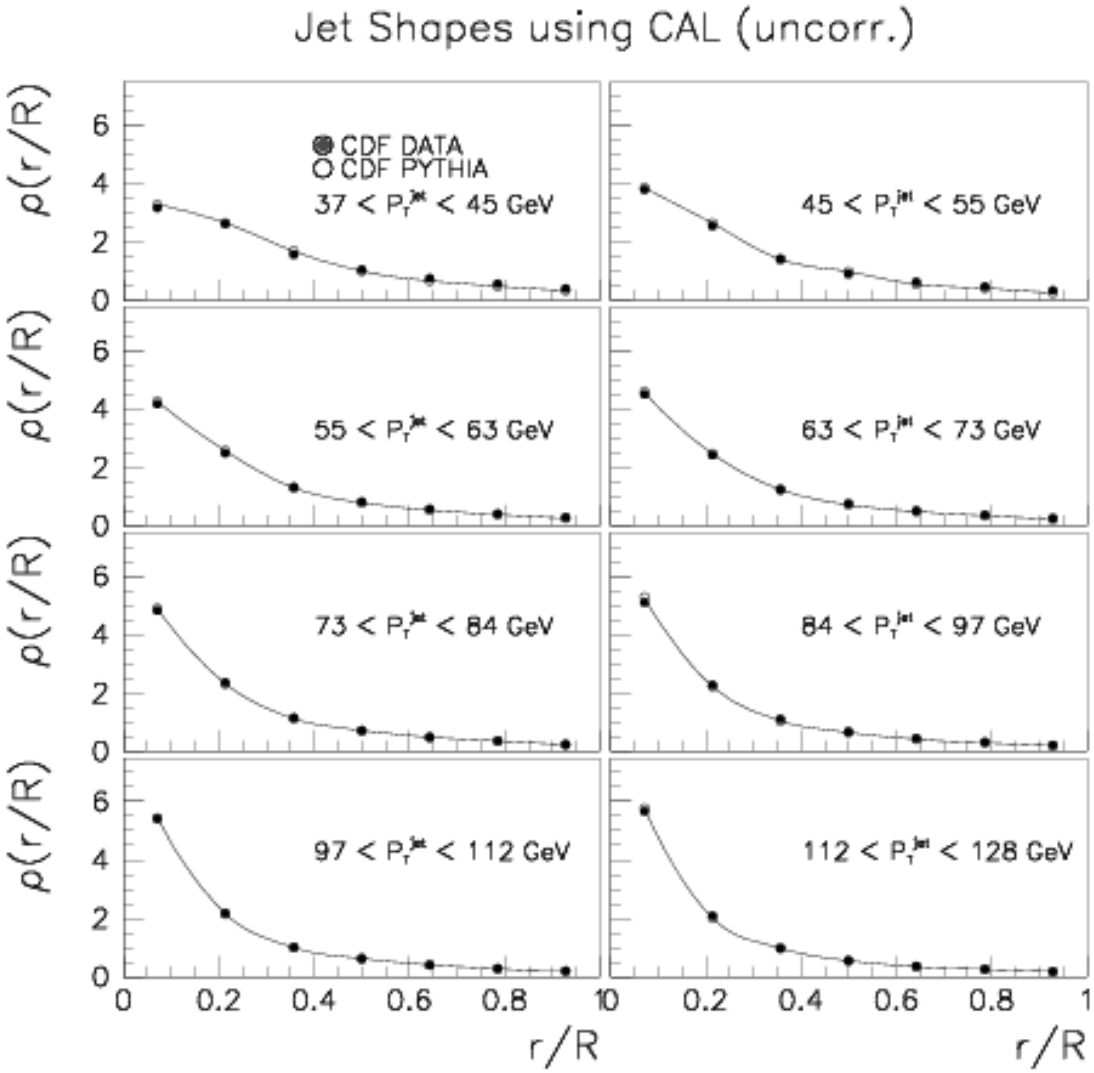
$$\rho(r) = \frac{1}{\Delta r}\frac{1}{N_{jet}}\frac{\sum P_T^{tracks}(r \pm \Delta r/2)}{\sum P_T^{tracks}(0,R)}$$



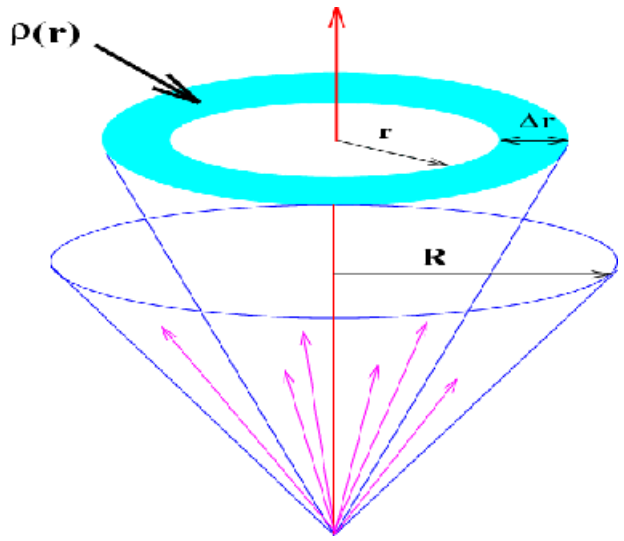
Jet Shapes using CAL (Ia)



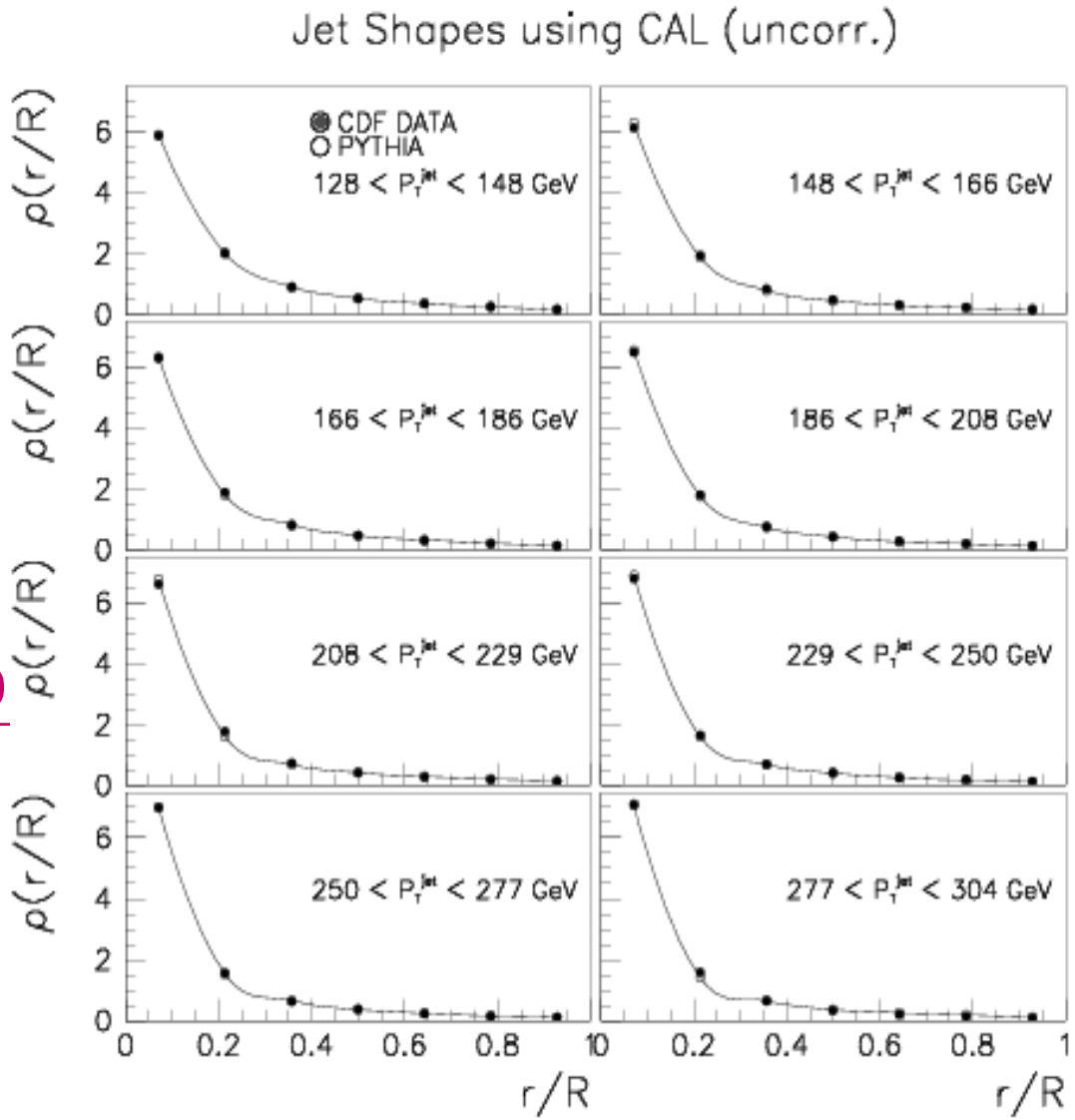
$$\rho(r) = \frac{1}{\Delta r}\frac{1}{N_{jet}}\frac{\sum P_T^{towers}(r \pm \Delta r/2)}{\sum P_T^{towers}(0,R)}$$



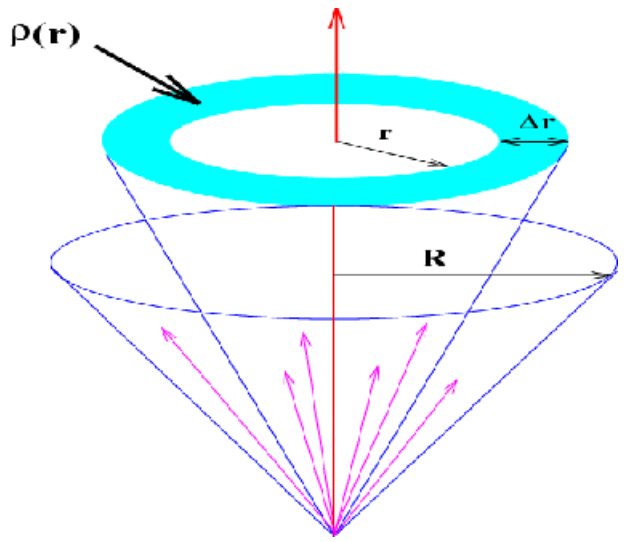
Jet Shapes using CAL (Ib)



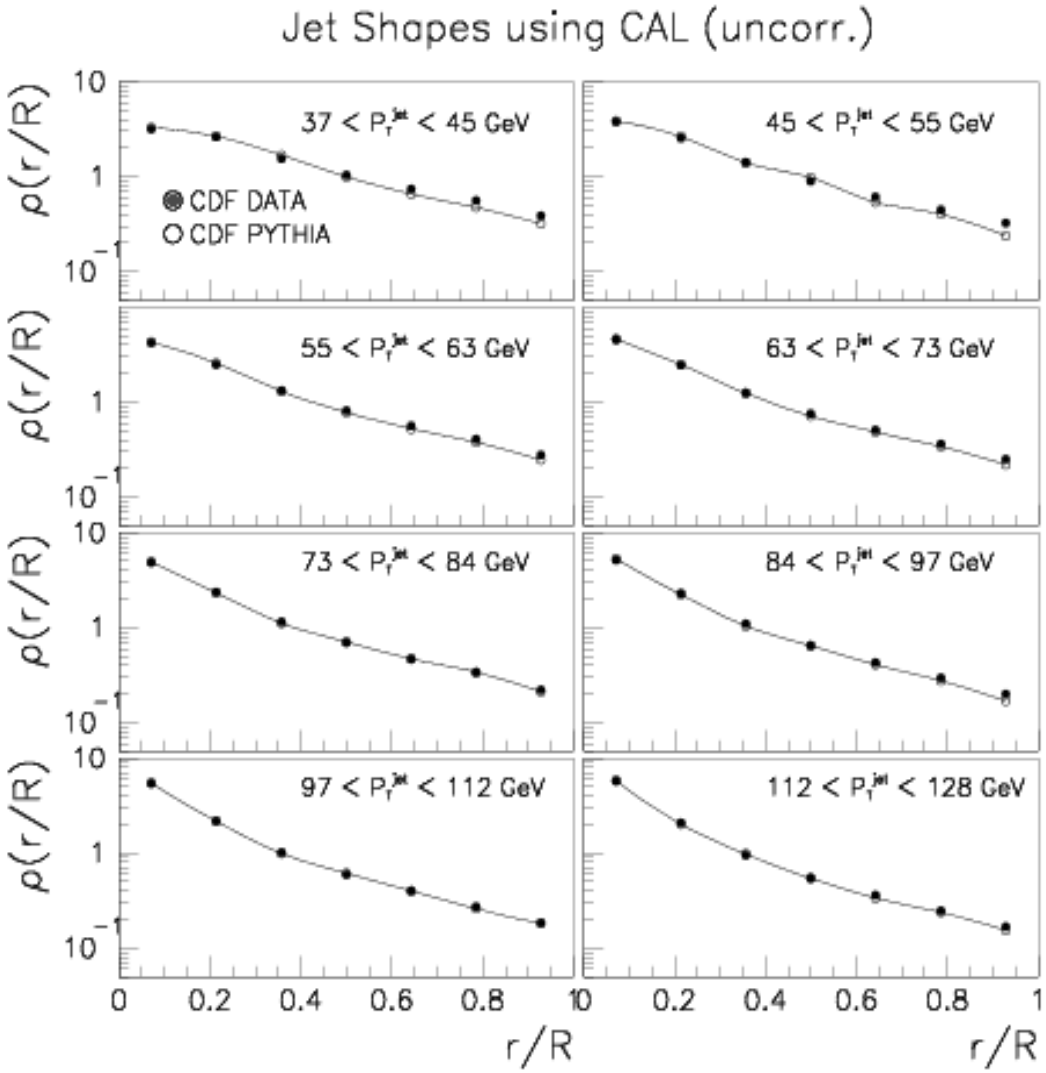
$$\rho(r) = \frac{1}{\Delta r}\frac{1}{N_{jet}}\frac{\sum P_T^{towers}(r \pm \Delta r/2)}{\sum P_T^{towers}(0,R)}$$



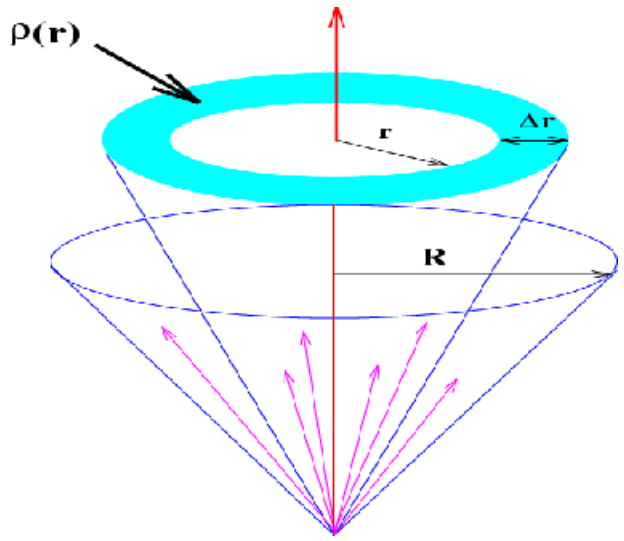
Jet Shapes using CAL (Ic)



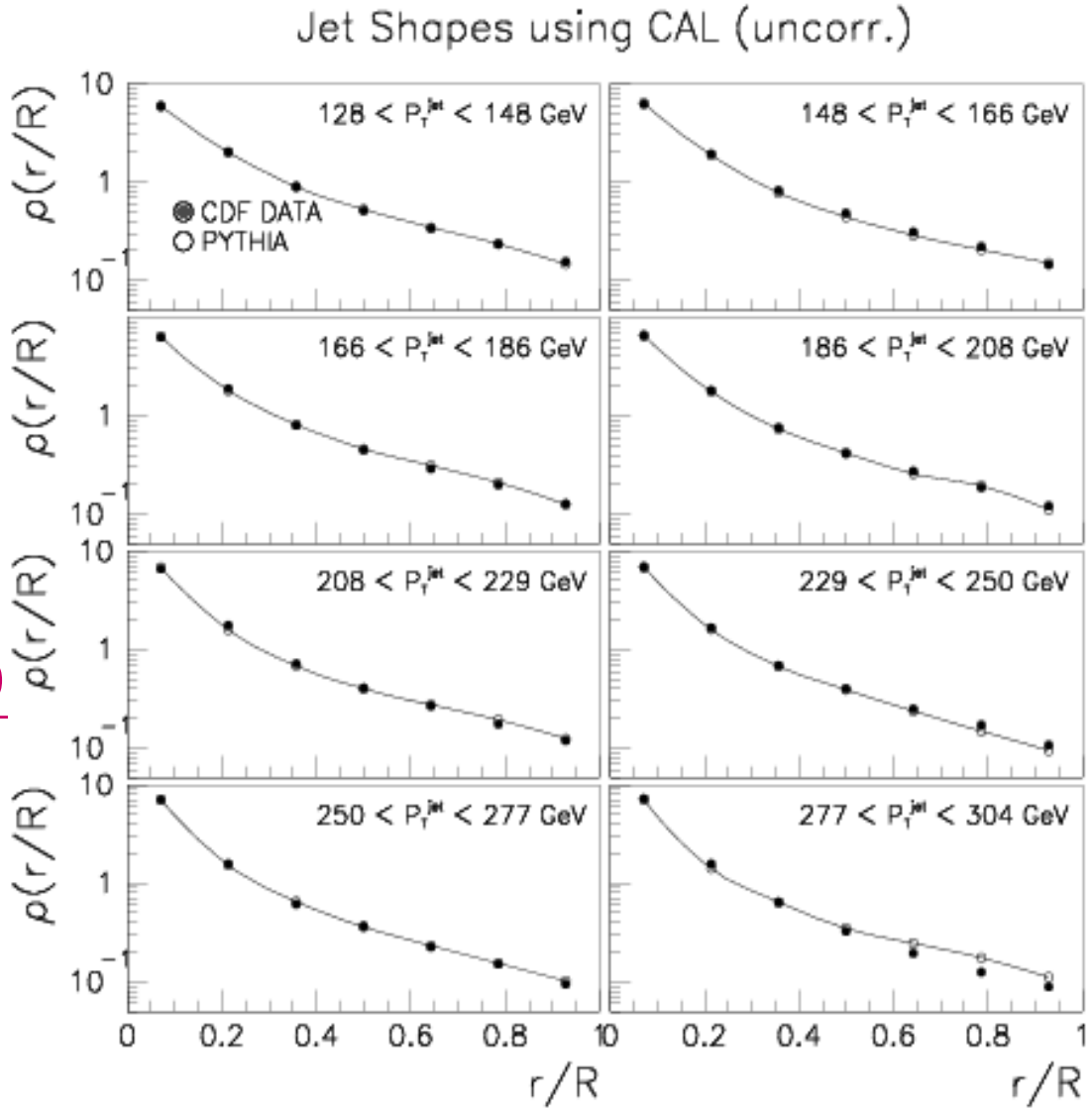
$$\rho(r) = \frac{1}{\Delta r}\frac{1}{N_{jet}}\frac{\sum P_T^{towers}(r \pm \Delta r/2)}{\sum P_T^{towers}(0,R)}$$



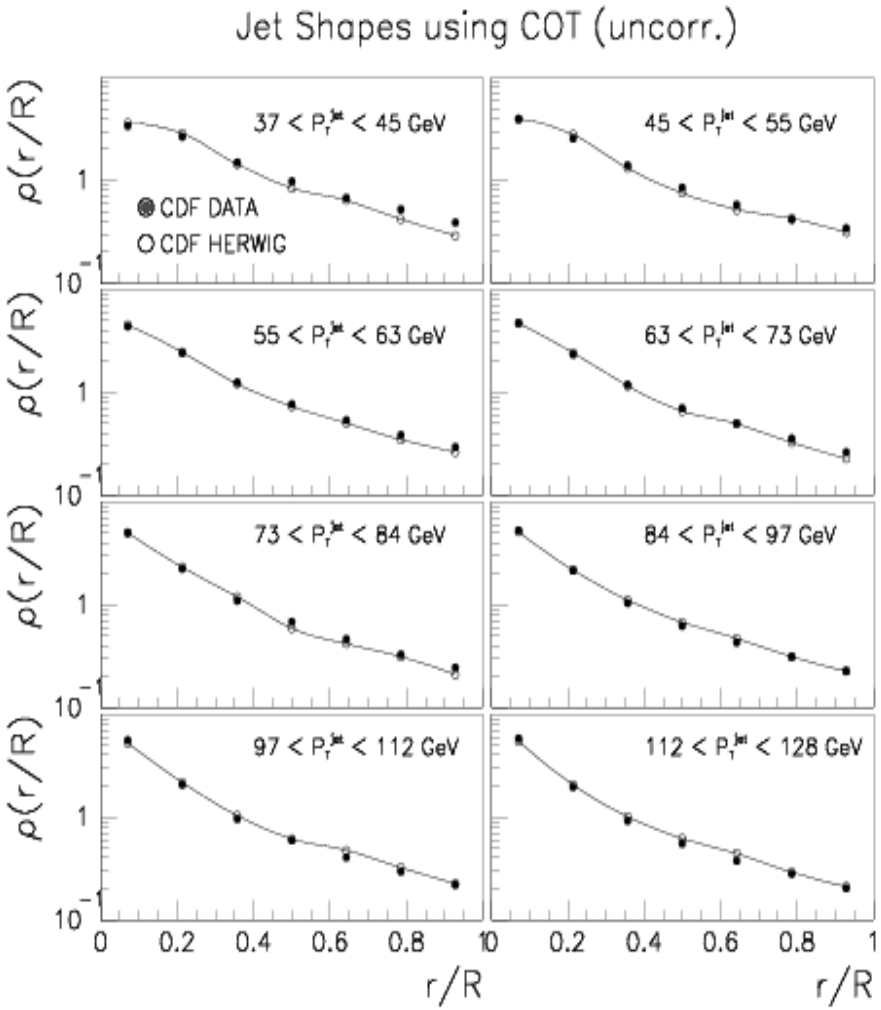
Jet Shapes using CAL (Id)

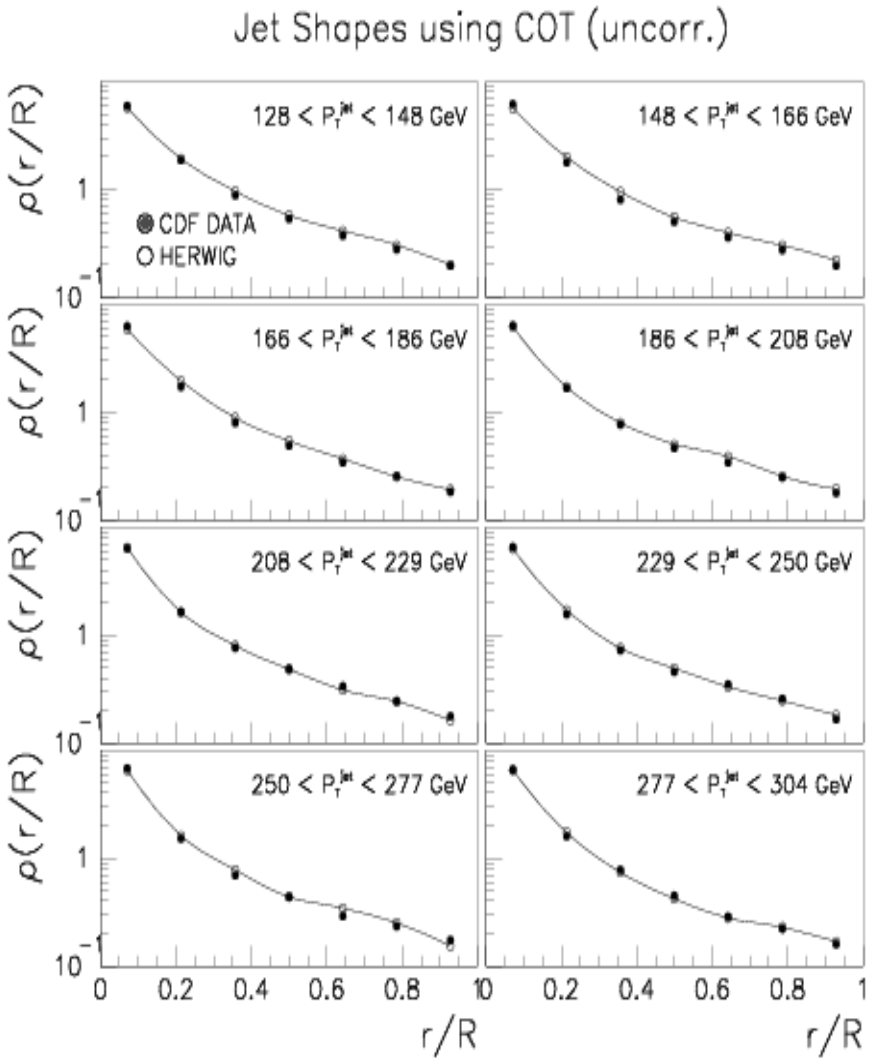


$$\rho(r) = \frac{1}{\Delta r}\frac{1}{N_{jet}}\frac{\sum P_T^{towers}(r \pm \Delta r/2)}{\sum P_T^{towers}(0,R)}$$

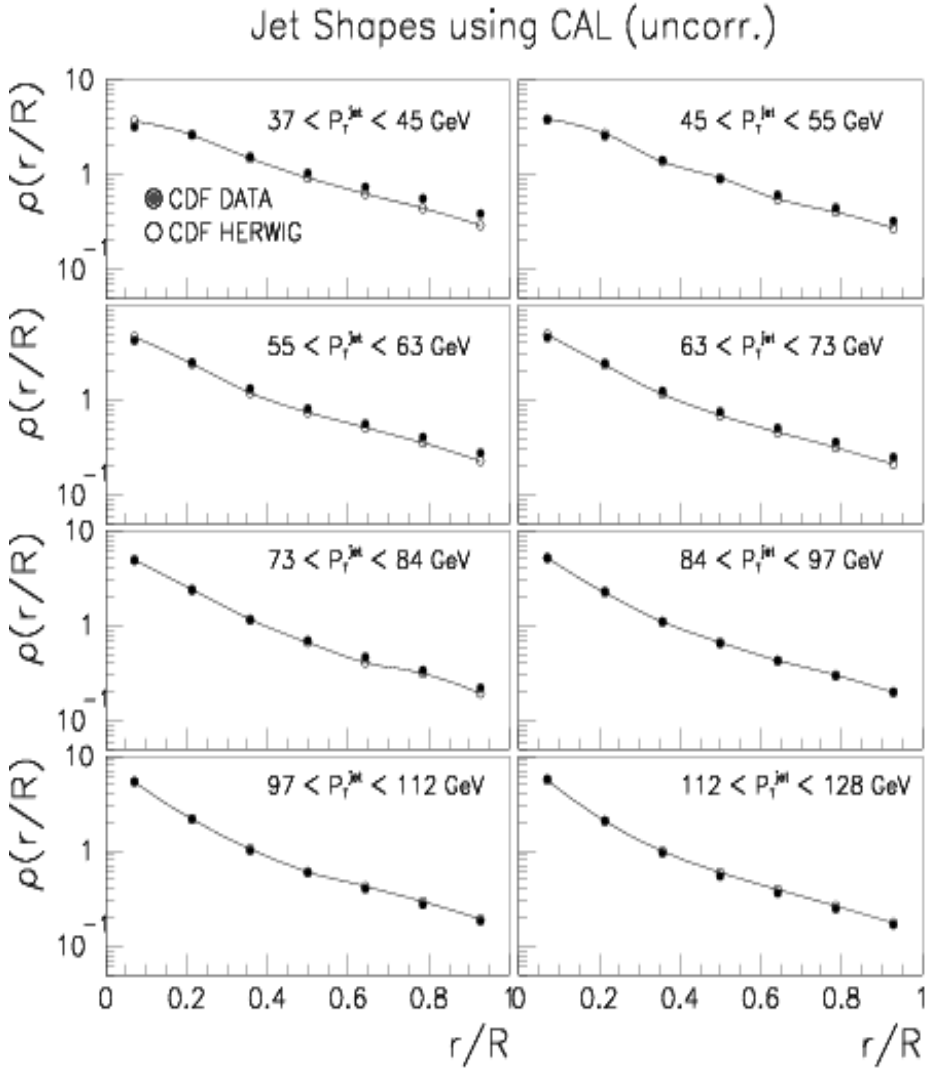


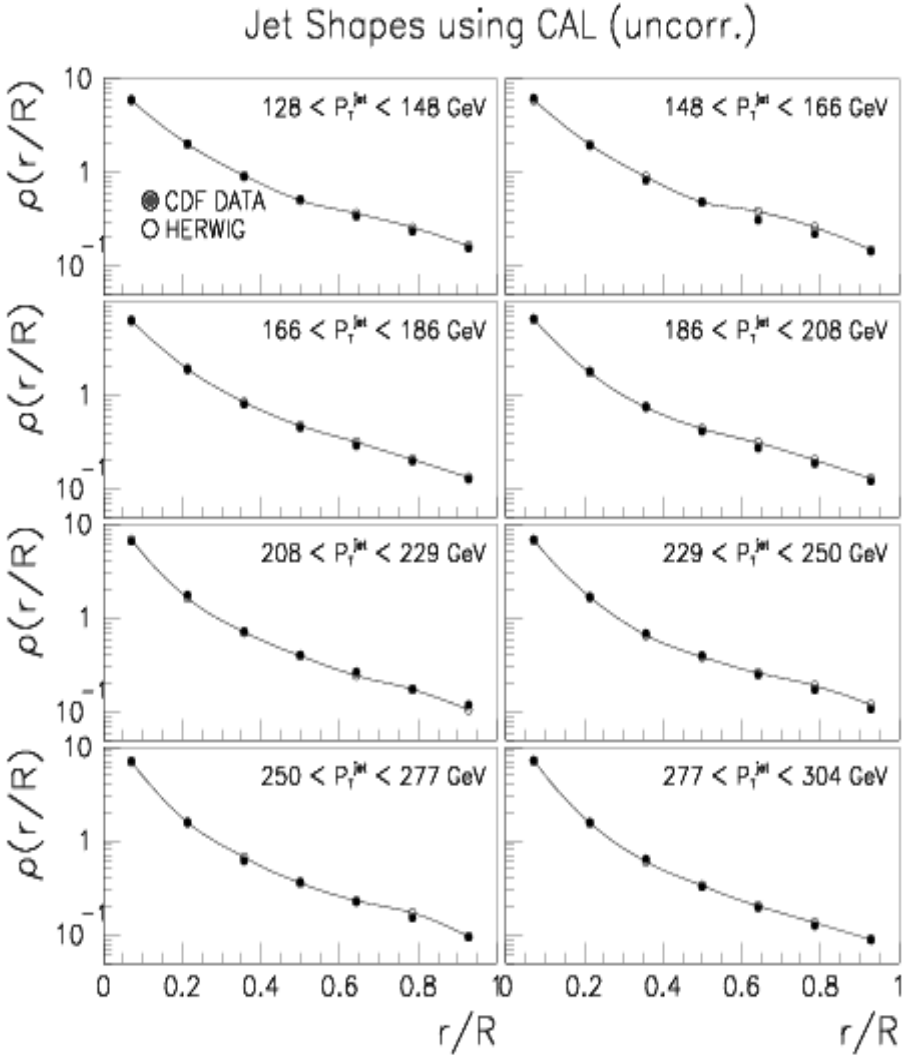
Jet Shapes vs Herwig (Ia)



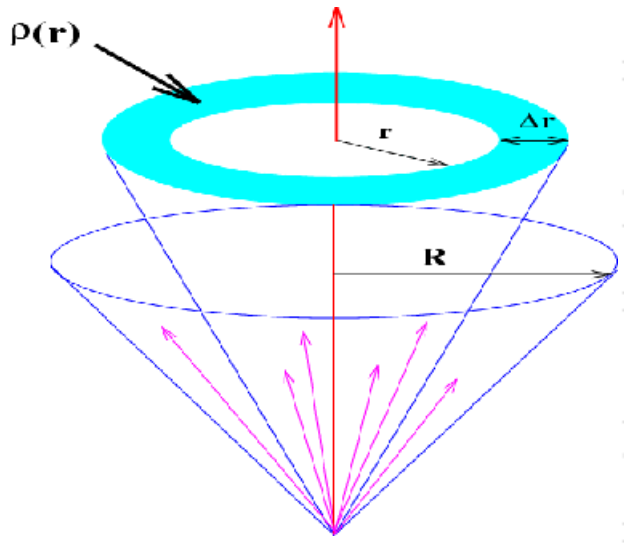


Jet Shapes vs Herwig (Ib)

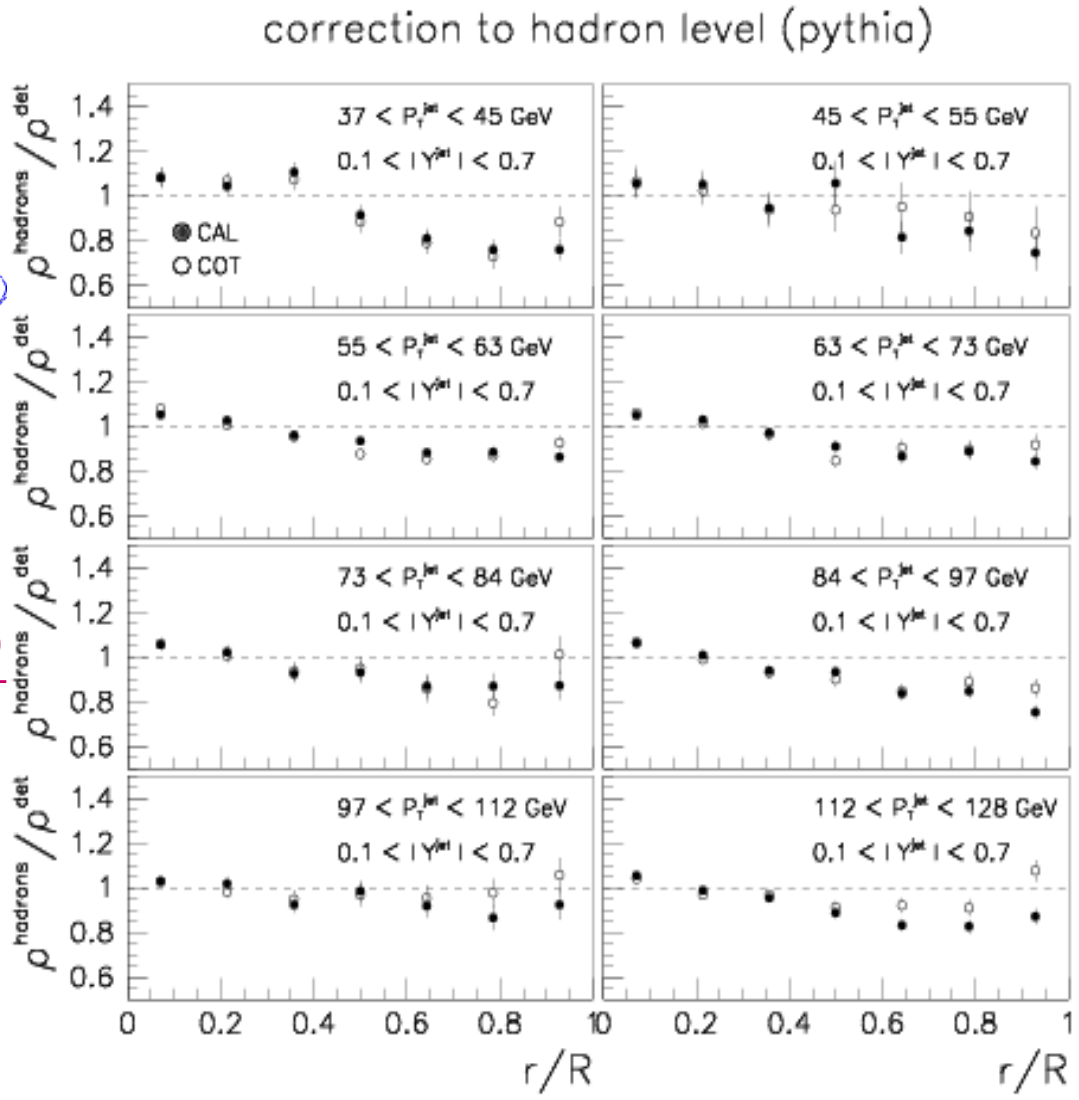




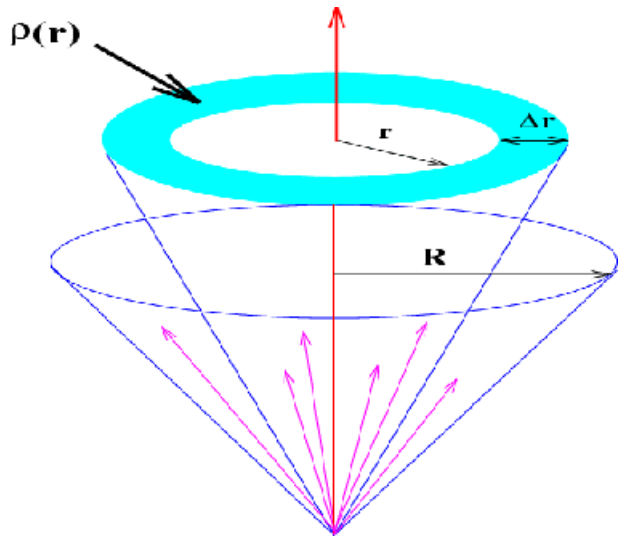
Jet Shapes Hadron vs Detector (I a)



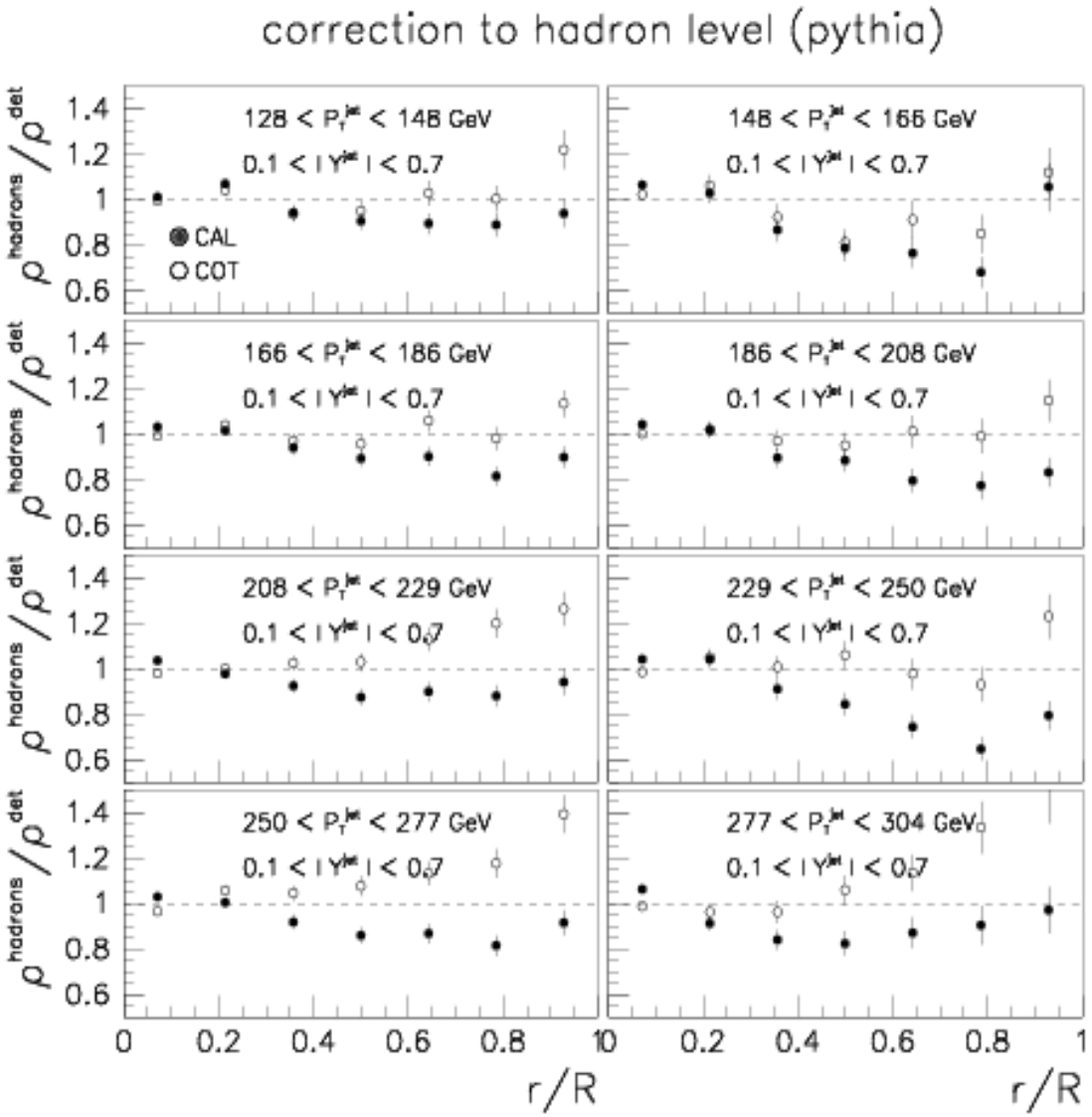
$$\rho(r) = \frac{1}{\Delta r}\frac{1}{N_{jet}}\frac{\sum P_T(r \pm \Delta r/2)}{\sum P_T(0,R)}$$



Jet Shapes Hadron vs Detector (I b)



$$\rho(r) = \frac{1}{\Delta r}\frac{1}{N_{jet}}\frac{\sum P_T(r \pm \Delta r/2)}{\sum P_T(0,R)}$$

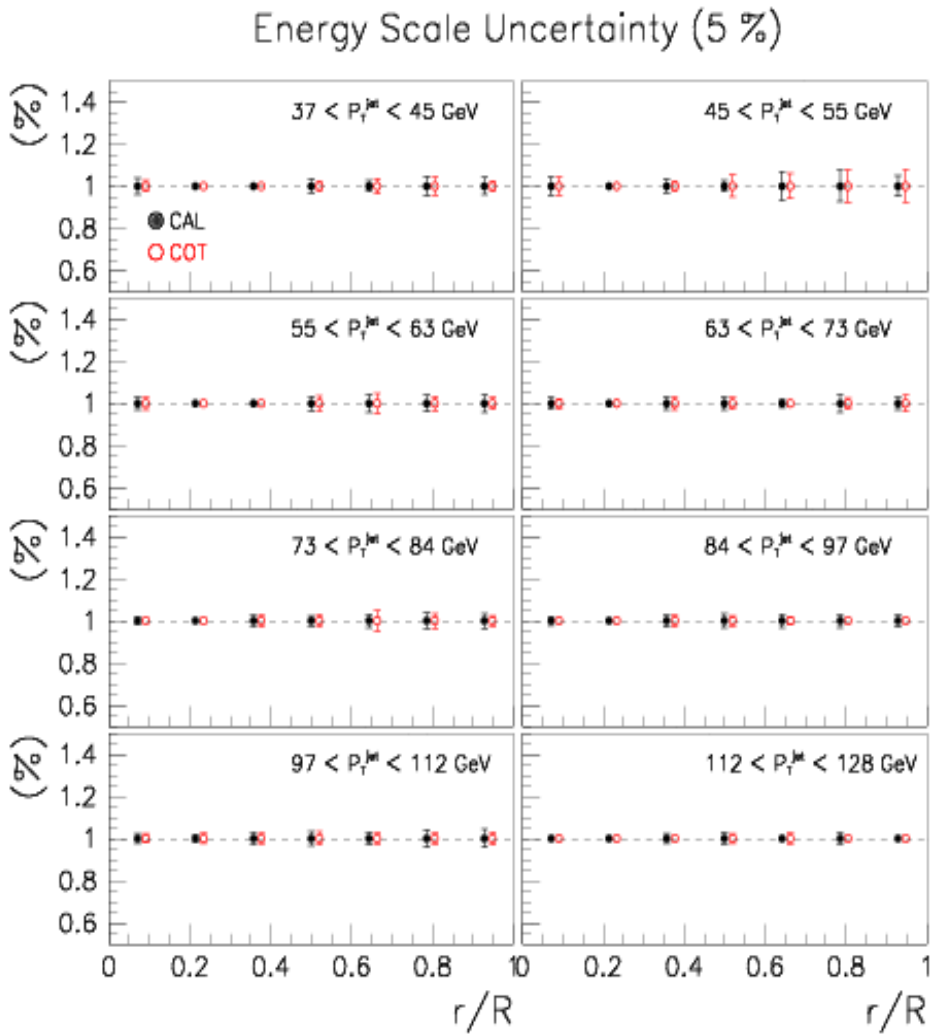


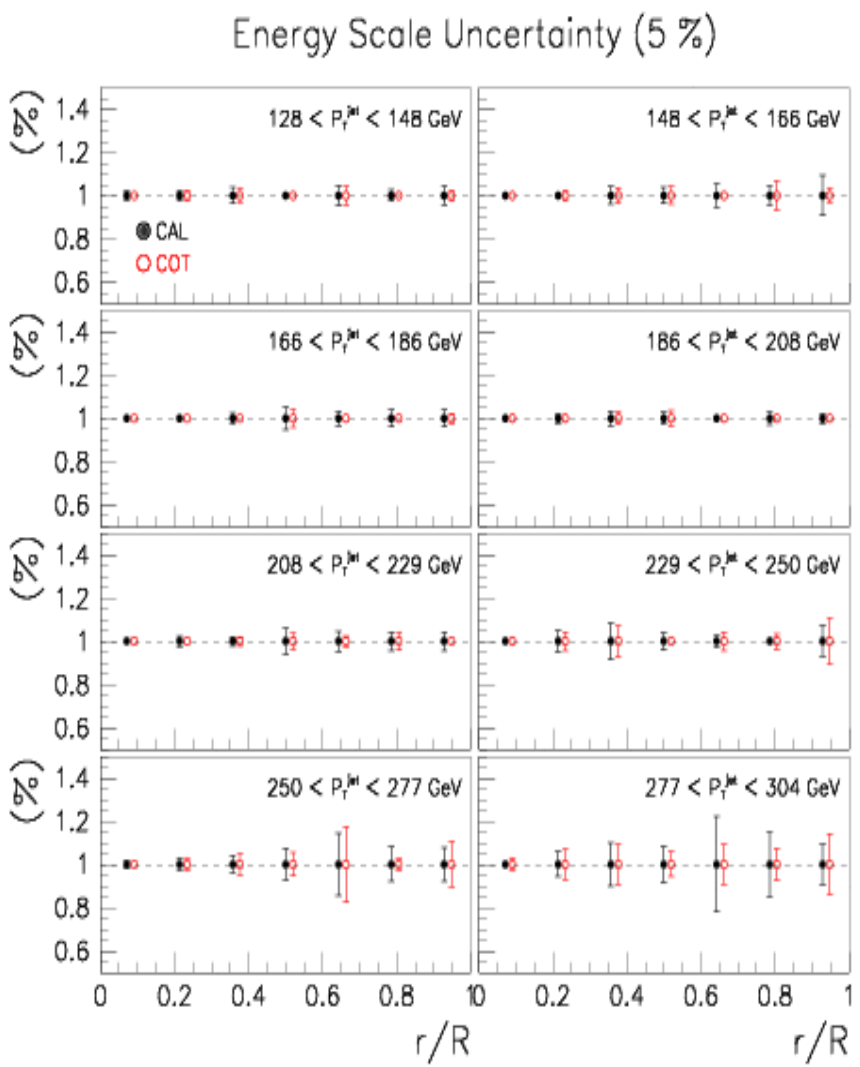
Systematic Uncertainties

- Energy Scale of Jets (+- 5%)
- Unfolding using Herwig instead of Pythia
- Simulation (difference on COT/CAL in DATA and MC ….ratio removes the physics…remains possible defects on simulation…

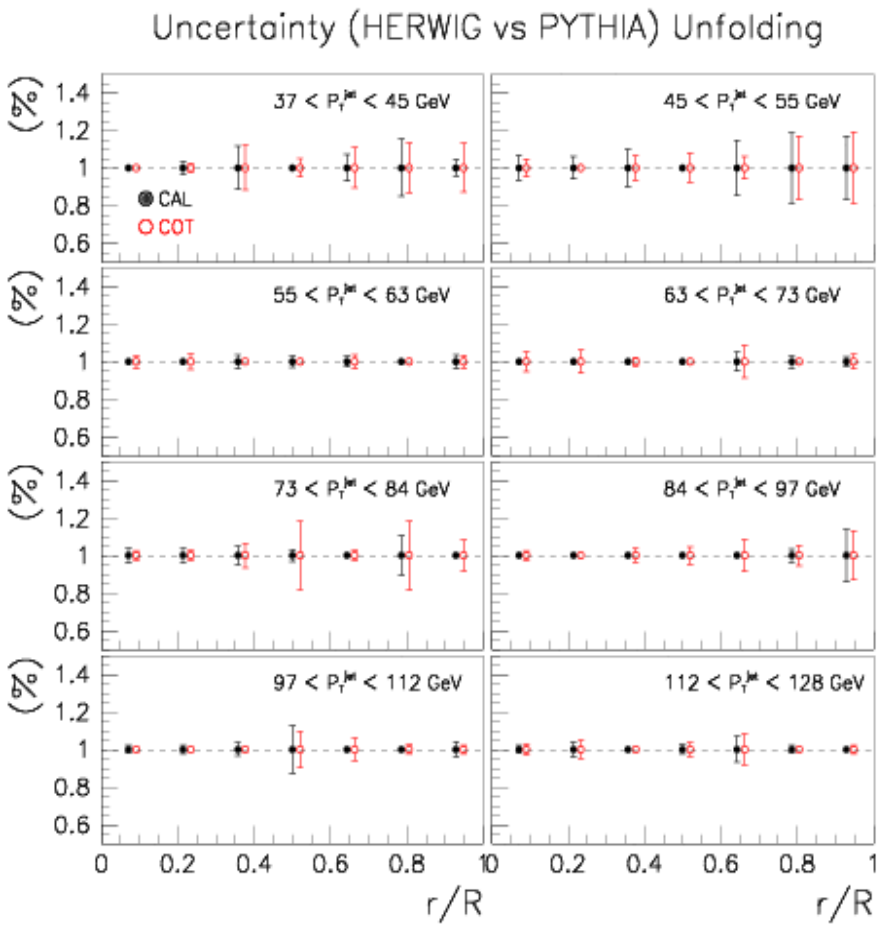
- Additional Checks
  - Independent with Inst. Luminosity
  - No affected by MidPoint reported bug

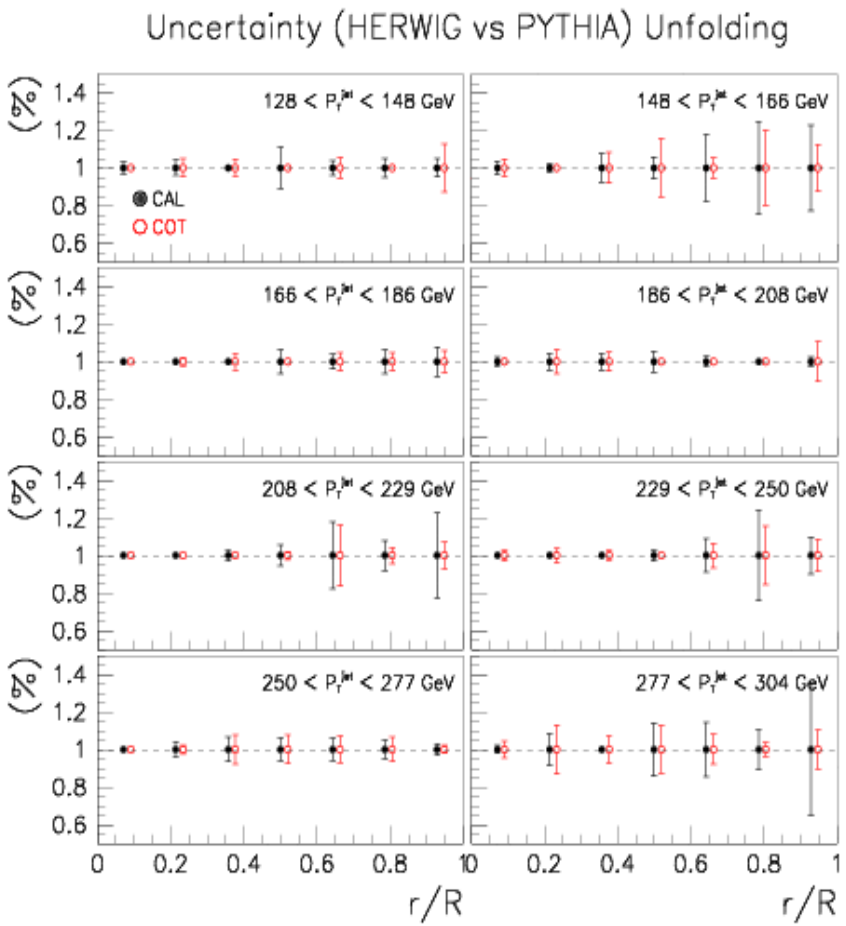
Systematic Uncertainties (Ia)



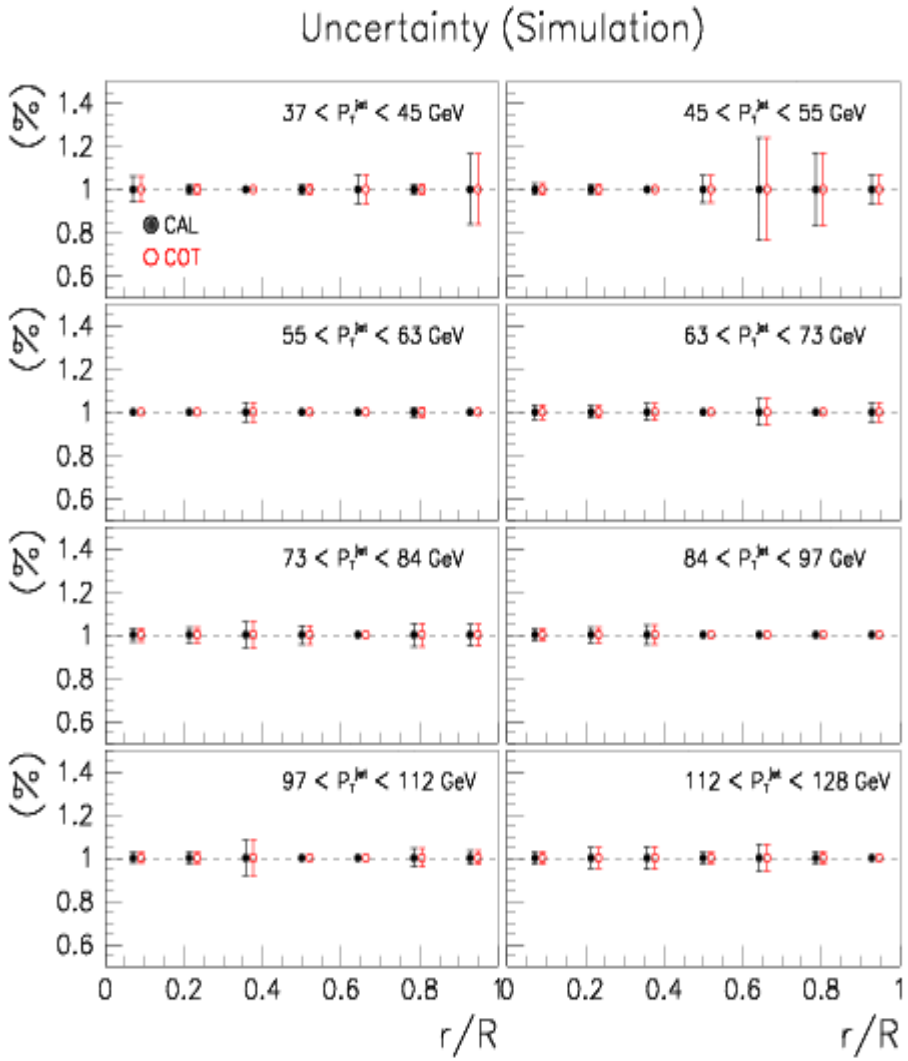


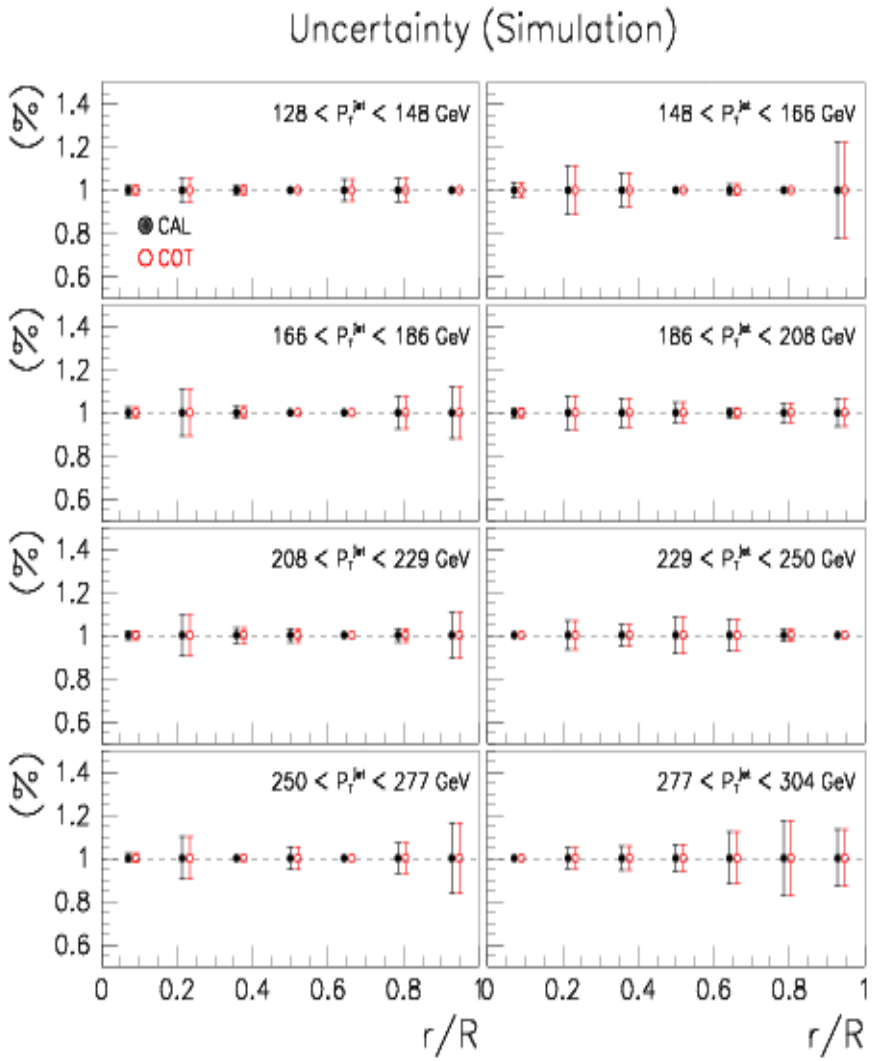
Systematic Uncertainties (Ib)



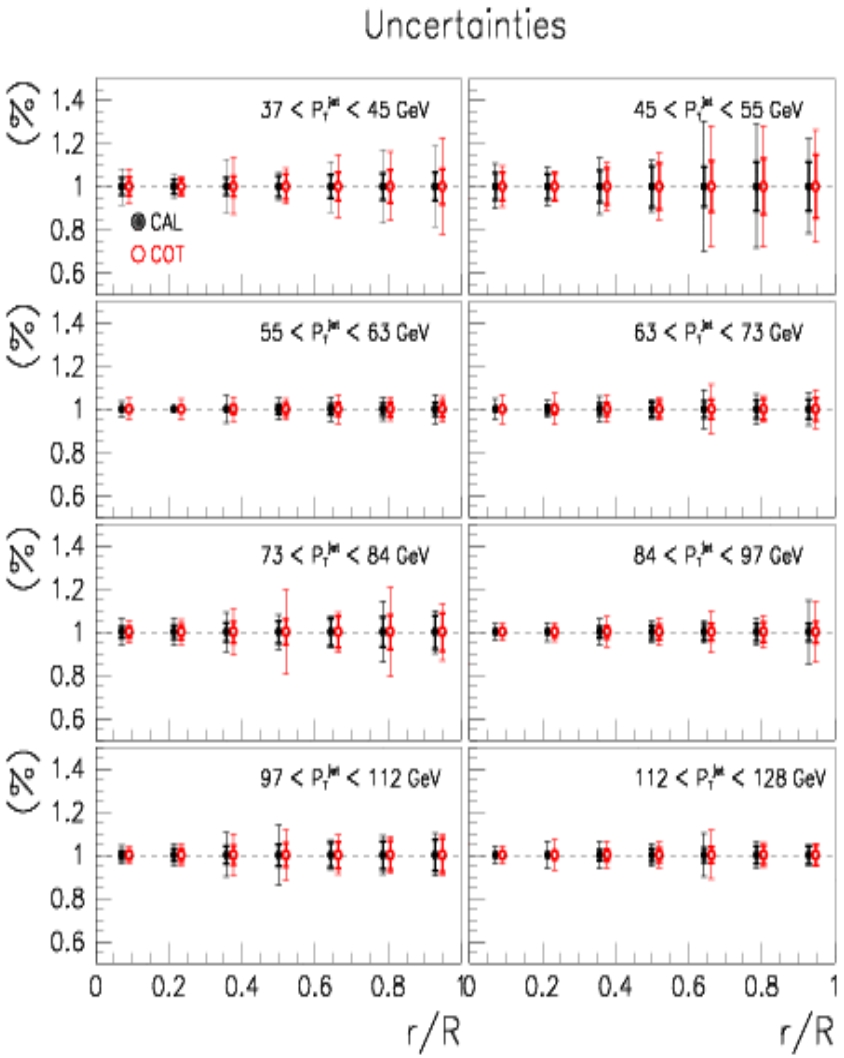


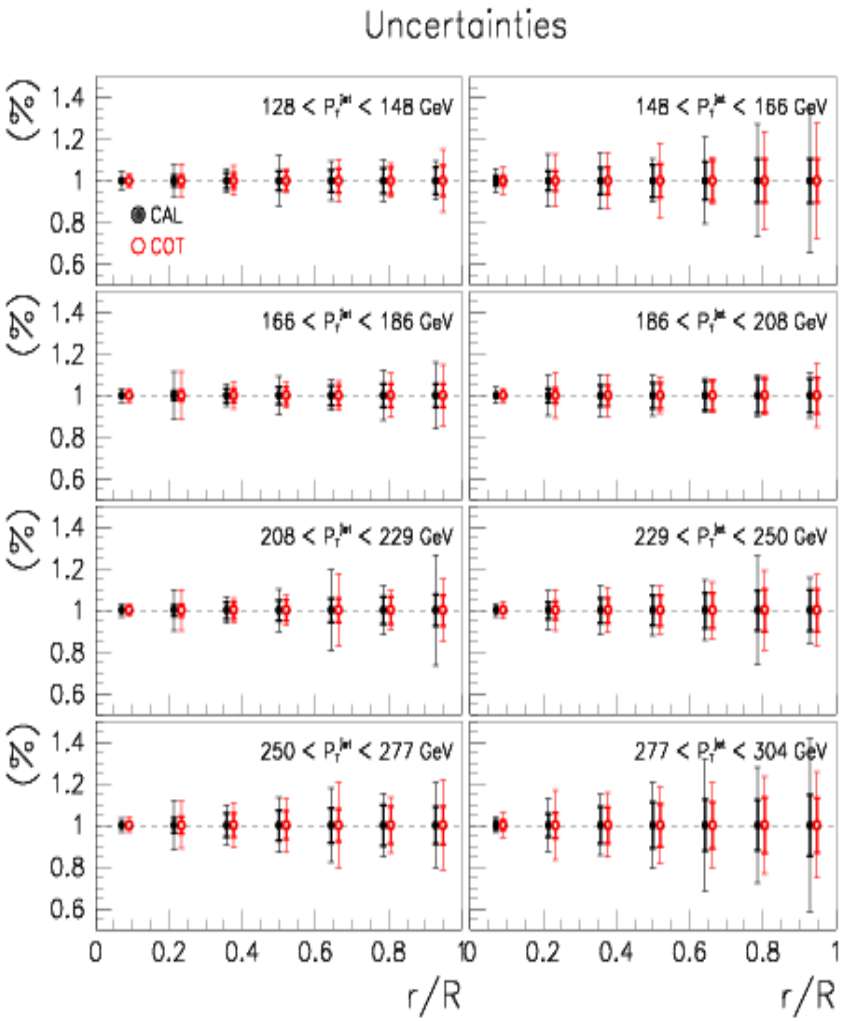
Systematic Uncertainties (Ic)



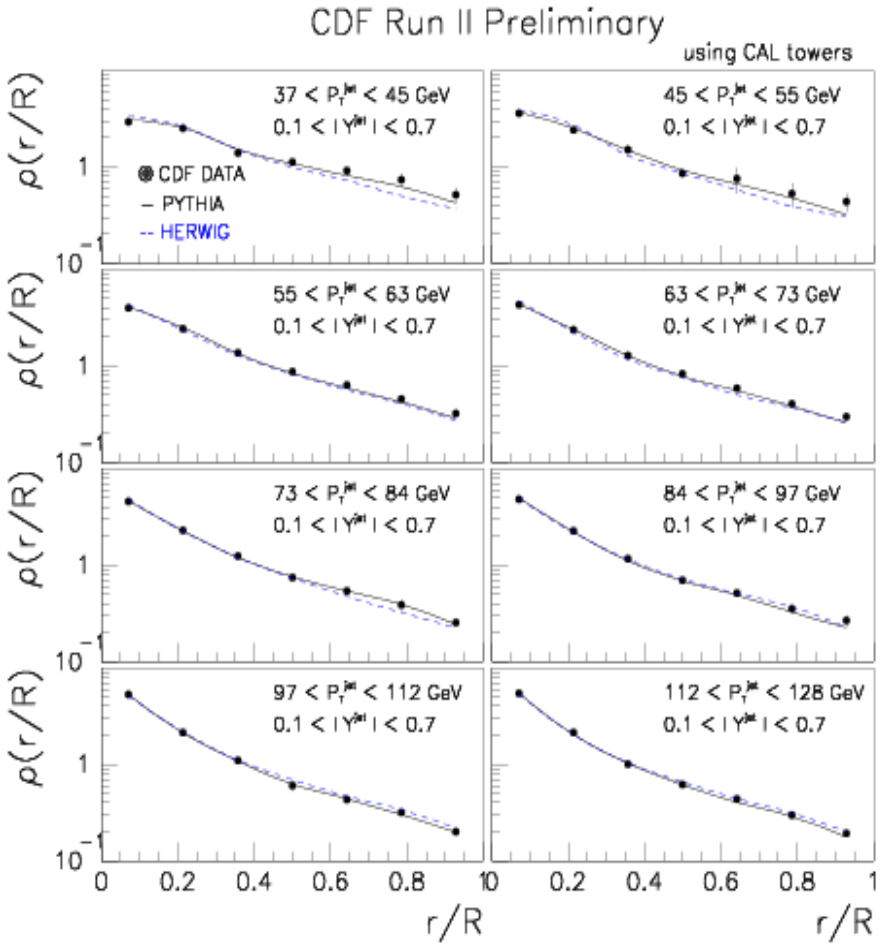


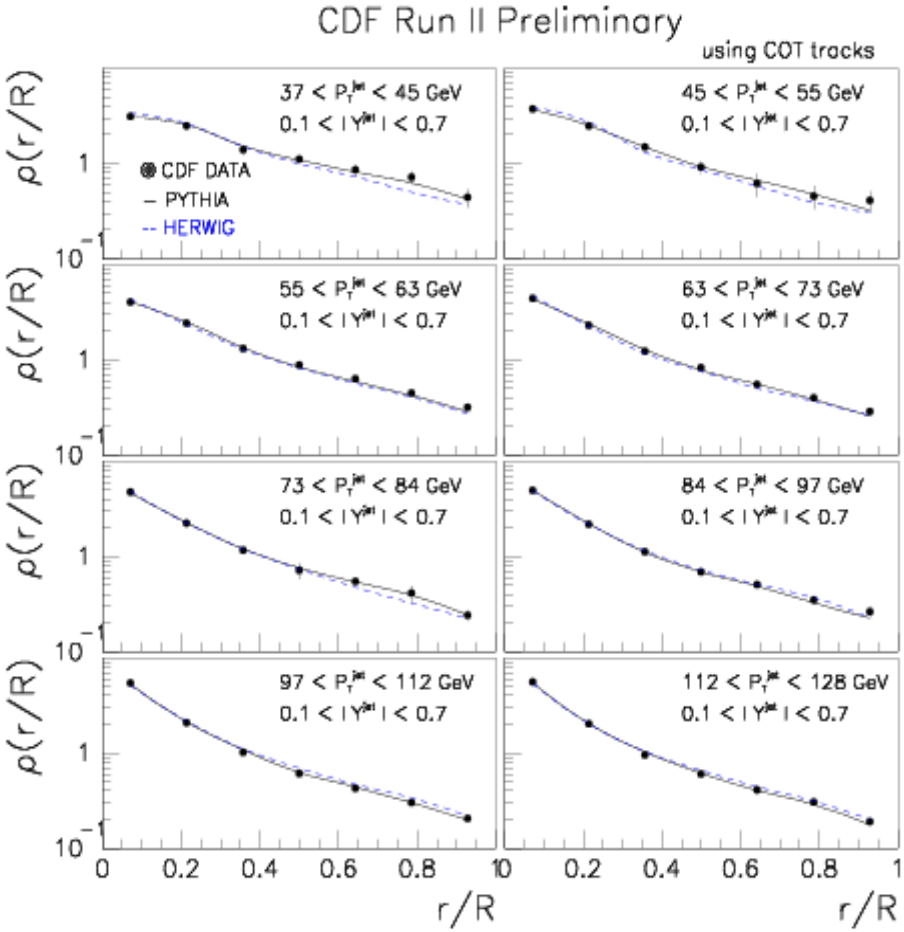
Total Uncertainties (I)



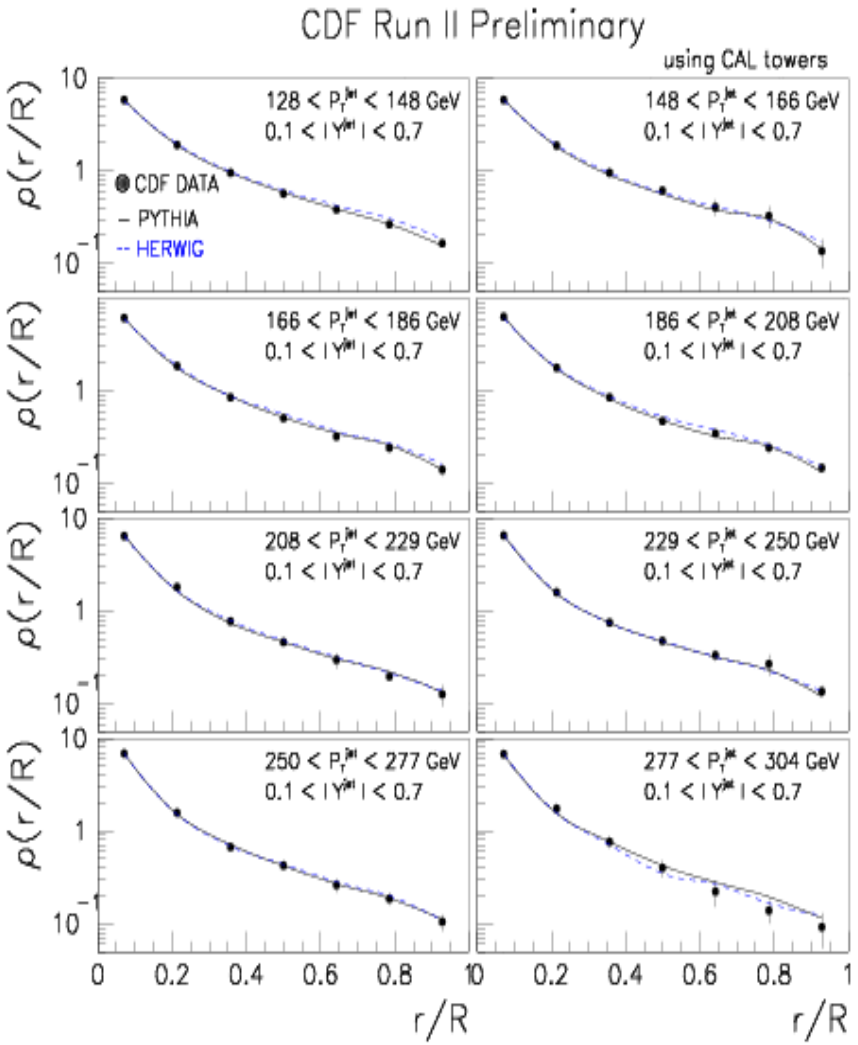


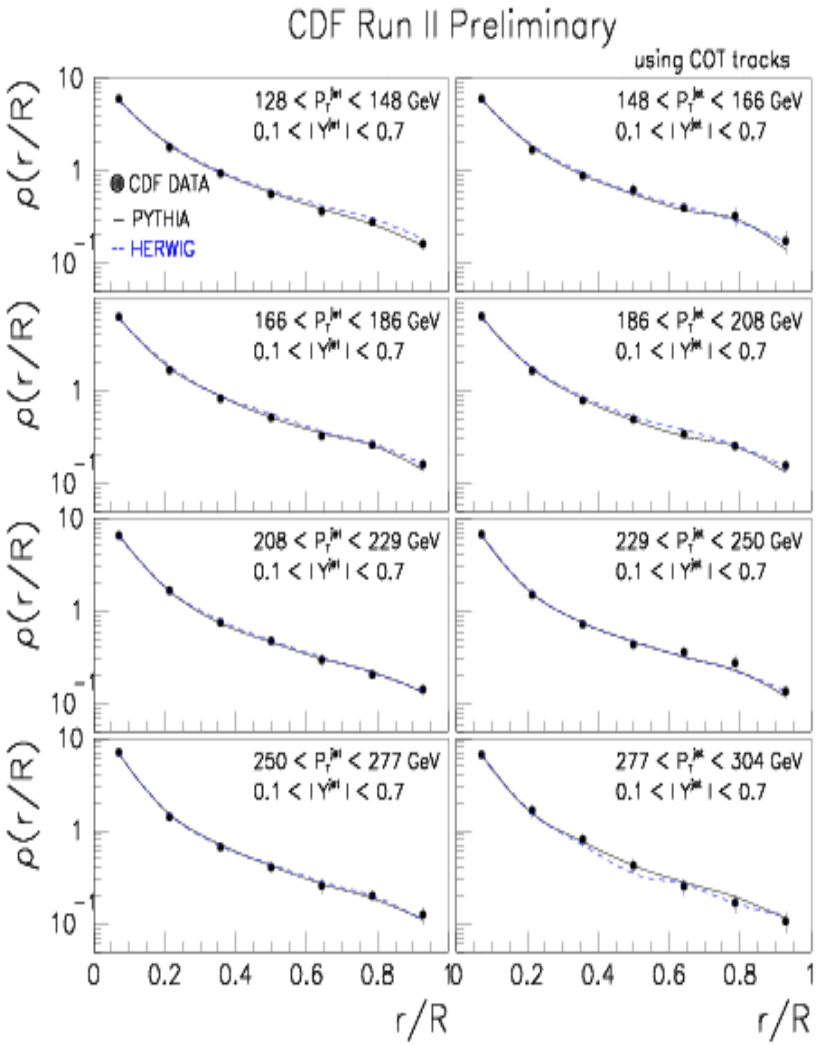
Final Measurement (I)



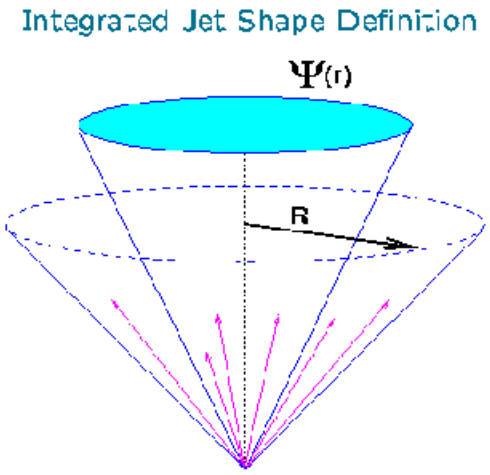


Final Measurement (Ib)

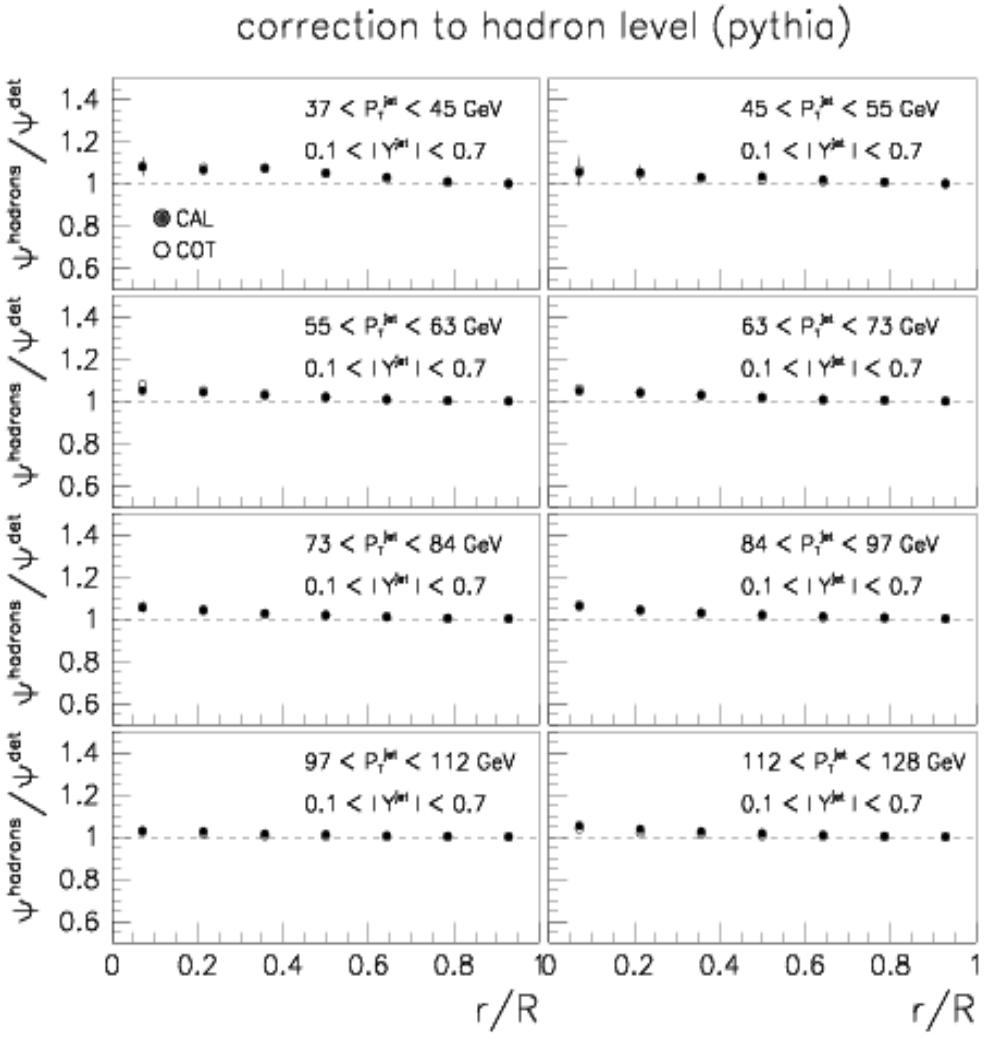




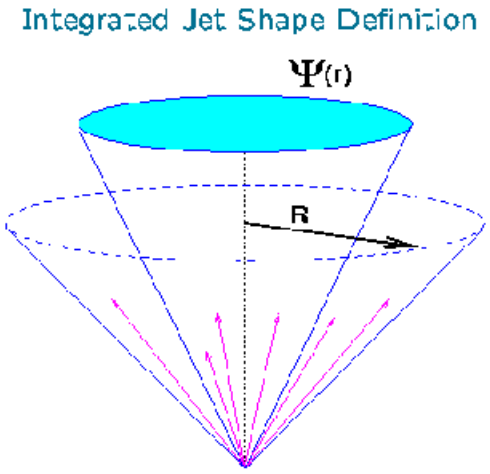
Integrated Jet Shape



Same procedure as
in the differential case



Integrated Jet Shape



Same procedure as
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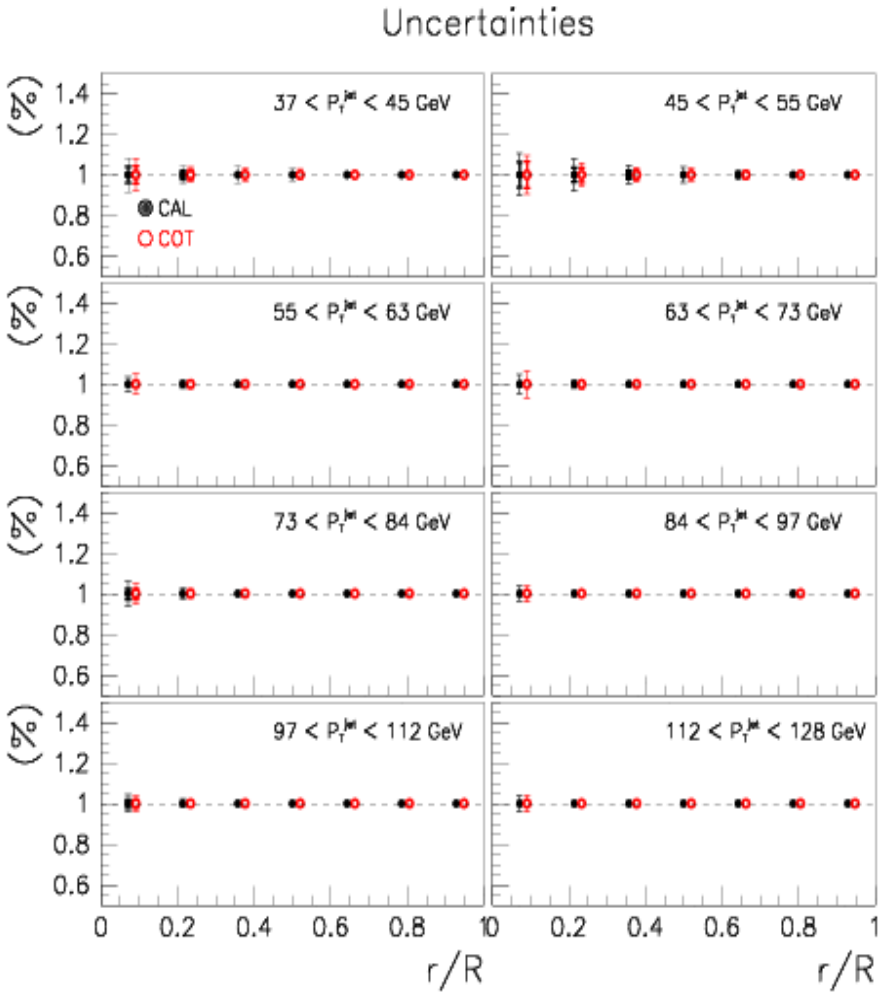
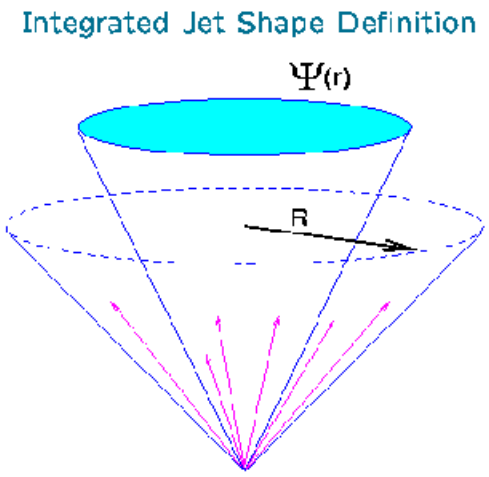


Integrated Jet Shape



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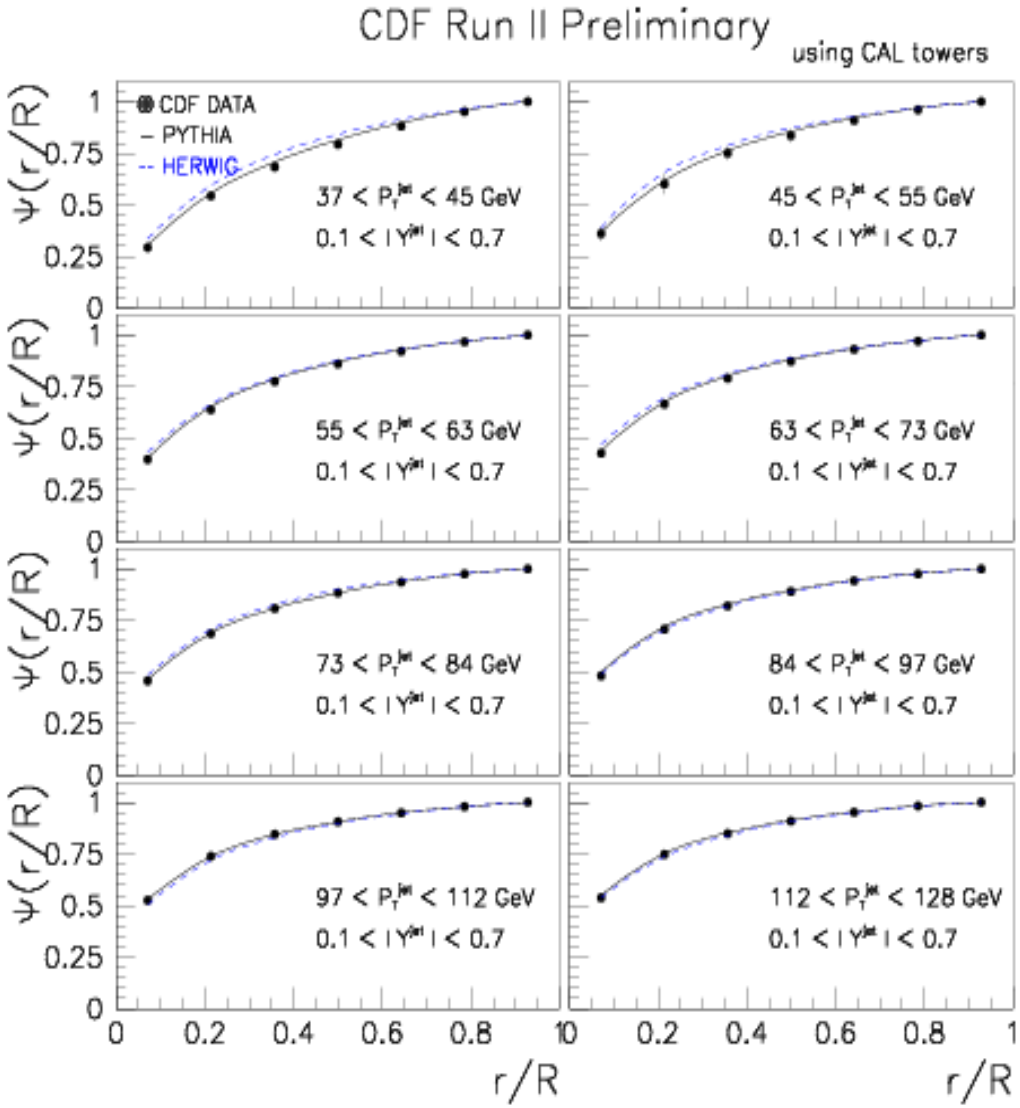
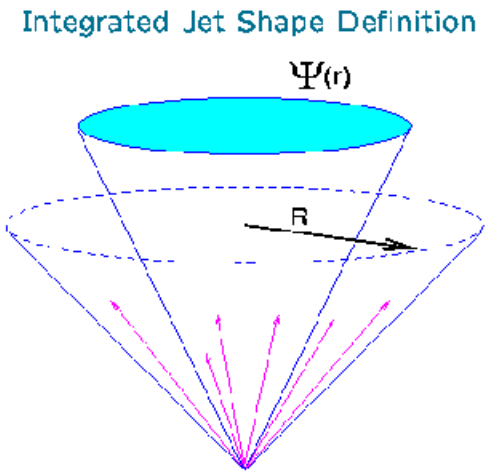
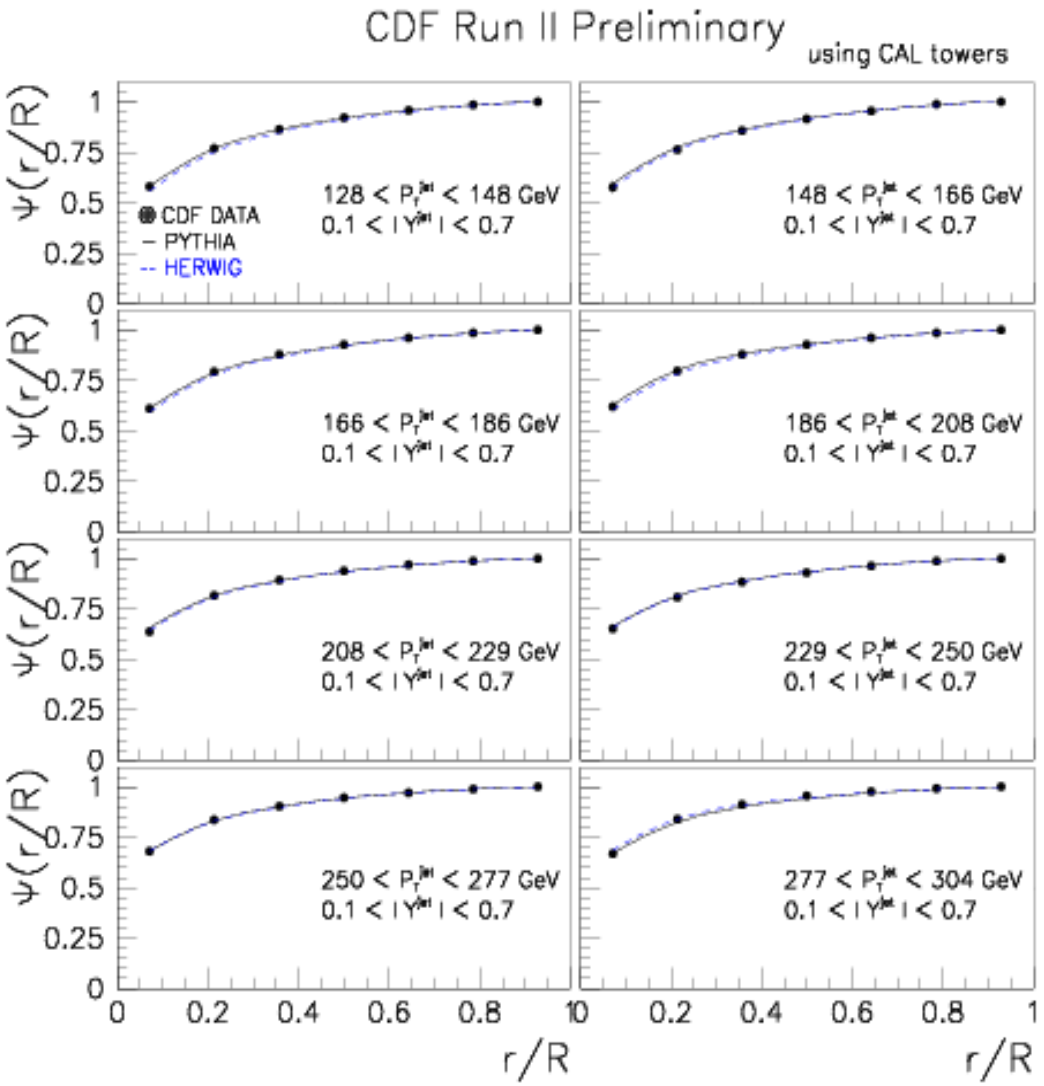


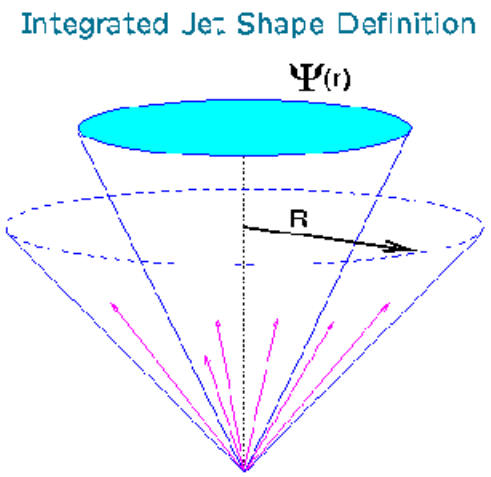
Integrated Jet Shape



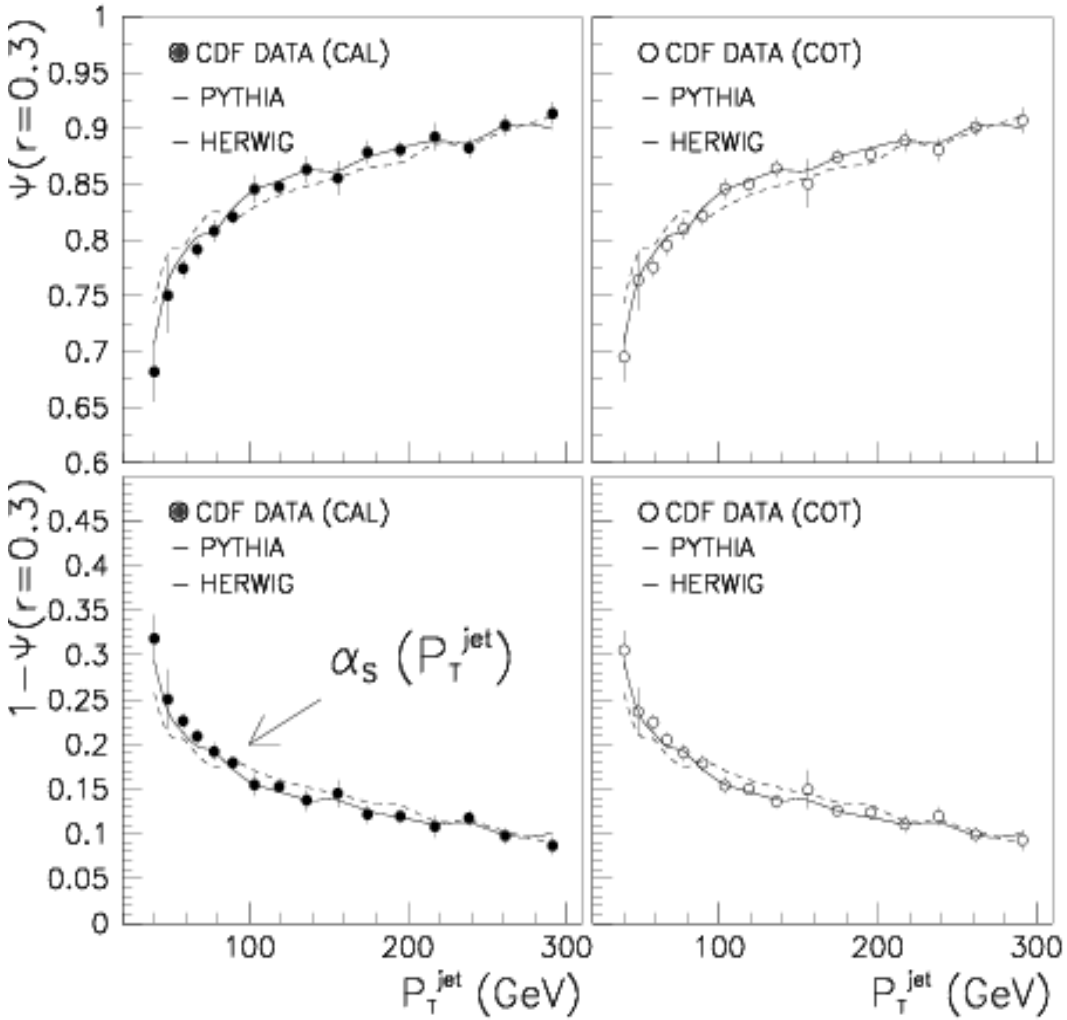
Same procedure as
in the differential case



Evolution with transverse Pt



Comparison with NLO pQCD would allow us to measured the coupling (module R_sep)



Plans

- Ready for Preblessing in two weeks
  - Still a bit of work to reduce systematics due to MC
  - Possible extension to ~400 GeV jets
  - Use of latest jet corrections (extended to higher pt)
- A complete CDF note on the way
- If possible comparison with NLO pQCD....
- Precise measurements very useful for future MC tuning…let's publish it now!
- Pythia Tune A makes a great job on jet shapes